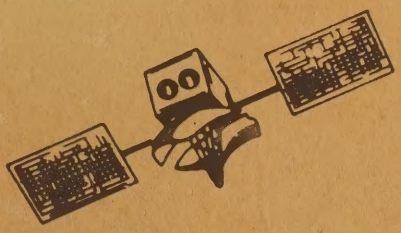
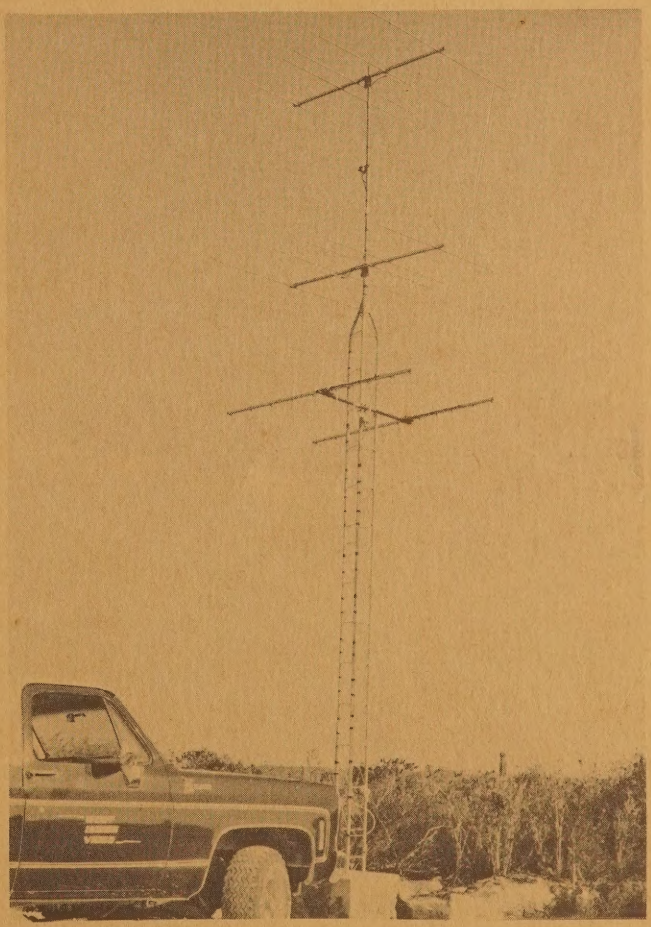


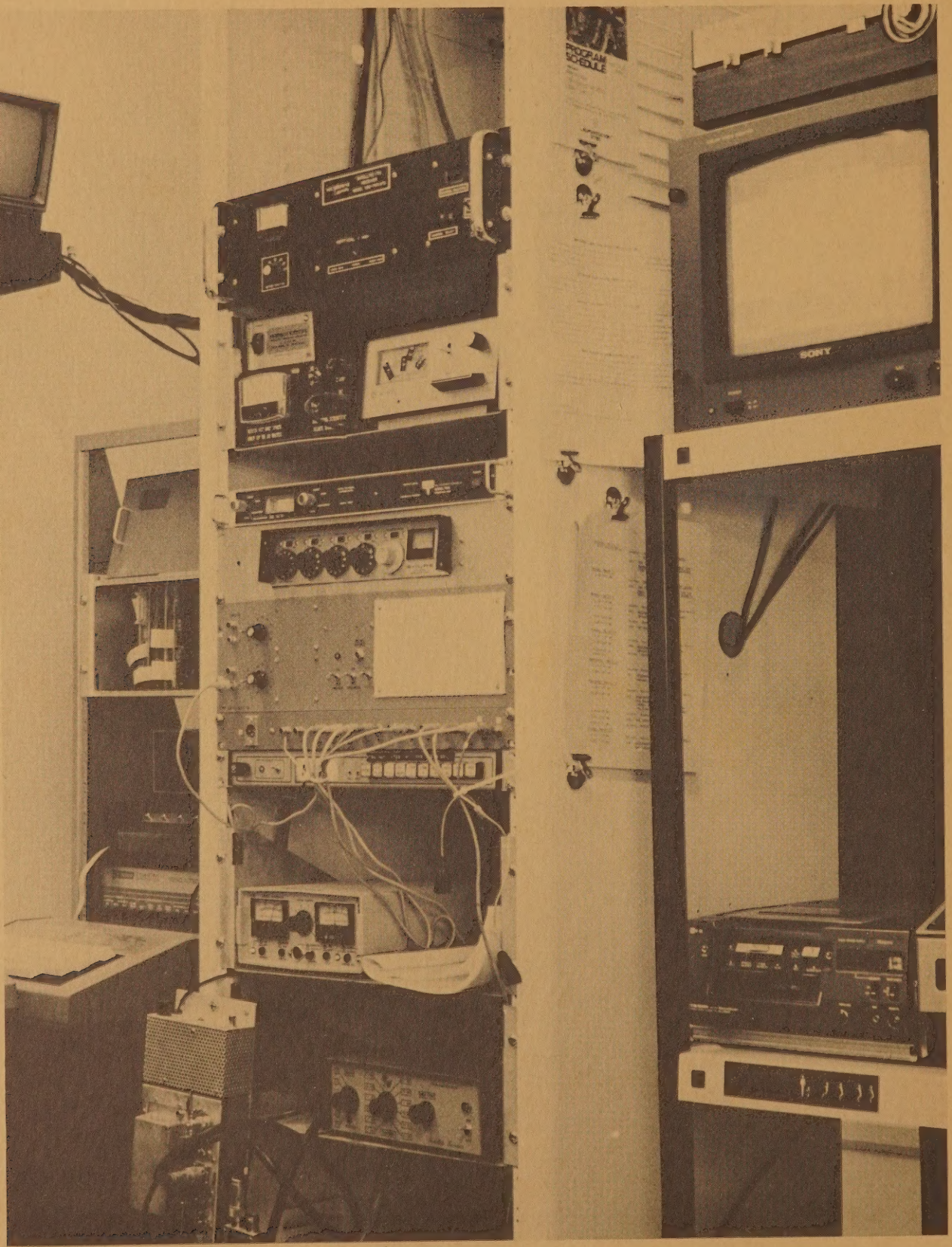
STT'S 1981 HANDOOK FOR LOW POWER TV PLANNERS



Copyright 1981 by:
Satellite Television Technology
P. O. Box G
Arcadia, OK 73007
and Richard L. Brown/Bob Cooper, Jr.

Low Power TV. In the first 90 days after official announcement of this new service the FCC received more than 3,000 applications for LPTV. In this co-authored Handbook Rick Brown and Bob Cooper explain the ramifications of the law, applying for an LPTV outlet and then building and operating the station.

PRICE: $60 per copy


PROGRAM
SCHEDULE
SONY

STT'S LOW POWER TV HANDBOOK

ME - a TV station OPERATOR??? It is not only possible but probable if you live in a rural area and can fund a $7-12,000 investment or live in a metropolitan area and can fund a $20,000 up investment. Low Power Television means local television for virtually anyone, any purpose, anywhere in the United States or its territories. Coupled with satellite programming sources, LPTV is the newest thing in the broadcasting world and you can be a part of it!

TOPIC — PAGE NUMBER

RESEARCHING / Filing For License 2
SITE / Channel Selection 3
PROGRAMMING / Possibilities 4
LEGAL / Requirements 5
COMPLETING / Application Forms 7
WAIVER / Appendices 11
FCC / Forms 12
FCC / Public Notice 20
FEDERAL / Register Announcement, Details 31
.....
PRACTICAL / World of Designing, Operating LPTV 48
SIGNAL / Source 49
AIR / As Transmission Medium 50
FINDING / A Channel 51
VHF / vs UHF 51
TRANSLATOR / Or Transmitter? 52
PRACTICAL / Real World System 53
10 WATT / VHF System Planning 55
INCREASING / Signal Density 57
SHOOTING / In Multiple Directions 58
BUILDING / An LPTV Network 59
VERTICAL / vs Horizontal 62
CONTROL / System 63
LOCAL / Titling 66
AUTOMATIC / Switching Control 67
VIDEO / Audio Levels 68
SUPPLIER / References 70

THE COVER - This is it. The whole thing. Low power TV can be exceptionally cost effective and viewer-efficient. Equipment already in the marketplace makes it possible for you to build a complete station to re-broadcast in your area on an unused VHF channel a national satellite service for under $7,000; **including the cost of the satellite hardware**! LPTV could change the scope and depth of rural American television; overnight. It will also have a dramatic impact on suburban and metropolitan viewing opportunities nationwide. Co-author Rick Brown (VP and General Counsel for S.P.A.C.E.) attacks the legal aspects of operating such a station while fellow author Bob Cooper explains how such a station goes together; a task he has already completed in the Turks and Caicos Islands.

THIS HANDBOOK has been produced and is being distributed by Satellite Television Technology with editorial offices at Grace Bay, Providenciales, Turks and Caicos Isles in the West Indies. Business offices are located at (STT), P. O. Box G, Arcadia, OK 73007 (405/396-2574). You can call the business office and talk with STT's Rick Schneringer virtually anytime. Getting a message through to the Turks and Caicos is quite another matter...

COPYING THIS HANDBOOK - is a no-no. Yes, we know that $60 is a bunch of bucks to lay out for something this size. It is the quality of what is here, not the quantity that determines the price. If you follow the advice in this Handbook you will save thousands of dollars in legal and station start-up fees and expenses. We figure that is a pretty good bargain. If you persist in copying the pages herein be advised that one of the co-authors is an attorney who knows and understands intimately the process of violating a person's copyright. Coop may be forgiving of the transgressions of you and your office copying machine; Brown may not be so benevolent. The entire contents (FCC forms aside) of this Handbook are copyrighted by Satellite Television Technology, Inc. and by co-authors Richard L. Brown and Bob Cooper, Jr.; © 1981.

CONTACTING STT - Satellite Television Technology is a publishing, video creation, seminar sponsoring business firm headquartered in Arcadia, Oklahoma. The firm is affiliated with West Indies Video, Ltd., a Turks and Caicos corporation which engages in similar activities as well as publishing **Coop's Satellite Digest**; the monthly international journal of low cost or private satellite TV activities (including the emergence of low power TV operations). STT receives mail at P. O. Box G, Arcadia, Oklahoma 73007. Mr. Rick Schneringer manages this STT office and he may be reached regarding this Handbook or other STT products / projects during any reasonable business hours at (405)396-2574. For the adventuresome who do not mind large telephone bills Bob Cooper may be reached at WIV-TV by asking your operator (dial O) for 'Overseas Operator 1 60 plus 1 05'. That will get you an operator in Jacksonville, Florida. Tell this operator you need to call 'Grand Turk 4273'. Be prepared to shout loudly and listen carefully; telephone circuits into the Turks and Caicos are frightfully poor. If you do not have the STT brochure listing more than six other 'Manuals', 'Handbooks' and numerous other materials available from STT, contact the Arcadia, Oklahoma office directly.

INTRODUCTION

For the first time in over twenty years, the Federal Communications Commission (FCC) has taken a step to open up new television channels. In order to expedite matters, the FCC has adopted interim procedures under which applications are processed pending the adoption of final rules governing the new service.The new stations will broadcast with "low power," hence, low power TV (LPTV) is the name of the new service. The LPTV channels are located in the VHF (Channel 2 - Channel 13) and UHF (Channel 14-Channel 69) bands nationwide. The channels may be used to provide commercial or non-commercial television programming and pay TV (subscription) services. LPTV might be programmed by installing a satellite earth receiving station and contracting with one of the program suppliers distributing signals via one of the domestic satellites. Or, the channel might be programmed on a stand alone basis, that is, by locally produced programming -- taped or live. The programming possibilities are limited only by the resources, ingenuity and creativity of the applicant.

There are **no requirements specifying the number of hours per day** that must be programmed. Other regulations applicable to full service commercial TV stations such as the requirement to ascertain community needs and interests, or compliance with the fairness doctrine and equal time rules have been reduced or eliminated in the case of LPTV. There are no present limitations on the number of stations for which applications may be made. **However**, under its interim procedures, the FCC will grant no more than 15 LPTV applications to any single owner pending the adoption of final rules for the LPTV Service. Furthermore, the FCC is presently considering adoption of a rule which would prohibit an Applicant from owning LPTV stations with overlapping service coverage. The FCC has also indicated that low power stations will have secondary status and will be permitted to operate **only** if such operation does not interfere with a full power station.

While the FCC debates which rules to adopt governing this new service, it has permitted the public to file applications which will be subject to these final rules. This section of the **STT** Handbook addresses the questions involved in deciding whether to file for a low power station. It also provides information on how to make such a filing. But, there can be no guarantee of success at the FCC even if you did everything suggested. First, the **final** rules have not been adopted and they may vary from the existing interim procedures. Second, there is no substitute for competent legal and engineering assistance and familiarity with FCC rules. One may be able to obtain a grant of an application without professional assistance; however, there will be numerous instances when such assistance would result in a difference in the FCC's final dispostion of a particular application.

This portion of the Handbook consists of four sections. Section I is an overview of LPTV Service. Section II assists in answering the questions contained in the FCC Form 326. Section III contains various appendices to be used as a starting point in obtaining waiver of FCC rules as well as the names of some potential program suppliers. Section IV contains a copy of the FCC Form 326, as well as a copy of the FCC's low power notice of its interim processing procedures and an FCC Question and Answer pamphlet. In order to understand how the FCC arrived at its present interim procedures for LPTV, it is useful to look at a brief history of the FCCs actions governing translators and low power broadcast stations.

This section prepared by Richard L. Brown and Fred Finn, law firm of Brown, Bernstein & Longest, 1521 O Street NW, Washington, D.C. 20005.

History / Translators and Low Power Television

The year is 1945. The war is over and the FCC has just established a new frequency allocation for television consisting of 12 VHF frequencies. The Commission provided for a minimum separation of 150 miles between stations using the same channel. This allocation scheme permits operation of only 650 television stations throughout the entire nation. As a result, only the largest markets can be served.

Because of this allocation, millions of Americans were deprived of the opportunity to receive television programming. Recognizing some of the difficulties, the Commission, in a few cases, waived its Rules to allow for more closely spaced stations. Substantial interference resulted in a few situations, leading the Commission to put a freeze on the expansion of commercial television. That freeze left many areas of the country without television service. The freeze lasted for four years, and by the time of the thaw (when the FCC authorized the use of new VHF and UHF TV channels), the seeds for two new industries had been planted: cable television and low power television.

In 1948, in Astoria, Oregon, the first television booster station was established.[1] Its purpose was to relay to the community the local TV signals which could only be clearly received at locations on hilltops near Astoria. Such a station consists of a receiving antenna, an amplifier and a transmitting antenna. When the signal from a distant TV station is received, it is fed into the amplifier where it is boosted and then sent to the transmitting antenna which rebroadcasts it to the local community. This idea caught on very quickly. Within eight years there were some eight hundred translators and boosters operating in the U.S. Most were located on VHF Channels 2 - 13. None, however, were licensed by the FCC.

In 1956 the Commission attempted to catch up with these unauthorized stations by authorizing translators in the upper 14 channels of the UHF band (Channels 70 through 83) and limiting power to 10 watts. However, many of the existing translator operators refused to vacate the lower bands they were using. The unlicensed operators were substantially aided in their struggle by the governors of most of the western states. The governor of Colorado, in fact, issued proclamations that purported to be licenses for the operation of translators in that state. It was not until 1960 that VHF translators were authorized and the outline of the current policies was established. In that year, Congress acted to authorize the previously constructed station. It also amended the Communications Act to permit unattended operation of stations that merely rebroadcast other broadcast stations, that is, stations which do not originate programming. Two years later, Congress passed the All-Channel Receiver Act requiring UHF capability on television sets. This law was designed to and eventually did promote the new UHF service.

Still, vast rural and mountainous areas were unserved. In 1966, Dr. Frank Cyr was granted a translator license to provide public television to various areas in the Appalachian Tier of New York State. He was also authorized to originate his own programming - a function translators had not previously performed. In 1971, the Corporation for Public Broadcasting (CPB) and the Alaskan Educational Broadcasting Commission conducted experiments using 1-watt and 10-watt transmitters to provide service to distant areas in Alaska. These experimental transmitters did not simply provide traditional rebroadcast services. They transmitted videotaped programs which were mailed to Alaska on a regular basis. These Alaska experiments proved that 10-watt broadcasting of original programming was technically feasible. By 1973, the FCC had issued three experimental mini-TV licenses. At the present time, licenses for more than seventy 10-watt broadcast stations have been authorized in Alaska.Waivers of FCC Rules to allow microwave feed of translators were granted in Nevada. Another popular low power station was operational in upper New York State on an "extra-legal" basis. In Canada a significant number of low power stations, both

licensed and unlicensed, have been operational for a number of years.

During the 60's and early 70's the FCC developed a liberal policy of waiving the translator rules to allow some programming production, although the translator rules themselves remained unchanged. Still, vast areas of the United States remained underserved. Recognizing these facts several years ago, the Commission initiated an examination of translator service. It also commissioned several independent reports designed to find out both the technical capabilities of low power television as well as some of the services that it could perform in expanding communications services to underserved areas. The result of that examination and those reports was a Notice of Proposed Rulemaking released October 17, 1980 in which the FCC proposed to vastly increase both the number and functions of low power television stations. That notice provides the starting point for the development of low power television.

Site Selection

Prior to filing your application at the Commission, it is necessary to secure a location for installation of your antenna and transmitter. This site should be selected both for its proximity to the proposed service area as well as its height. The greater the height, the greater the potential service area. Also, you should thoroughly examine such a site for terrain or building blockage. Often a site is selected without an actual on-the-spot survey. Later, when a visit to the site is made, it is found that a large building or range of hills blocks transmission. **Low power**, by its nature, **is a line-of-sight transmission**. It simply lacks the power to overcome large terrain blockages.

The Commission may require that you demonstrate that you have a secured transmitter site although actual proof is not necessarily a part of a low power filing. The best evidence that you have a site is a signed contract with the property owner. Often, this is impossible to obtain. In related areas, the Commission has accepted as evidence of site availability letters from land owners and affidavits from applicants attesting the receipt of site authority.

The height of the transmitter will be vital in determining the coverage. Other factors affecting that coverage pattern include the amount of power authorized and the terrain and foliage. Filings which have been made at the FCC have indicated that a coverage pattern with a radius of up to approximately 13 miles may be expected. If your site is located on the edge of the community you wish to serve, you may wish to use a directional antenna to optimize your coverage pattern. You will need the geographic coordinates of the site in degrees, minutes and seconds as well as a topographic map such as a United States Geological Survey map for the area of the proposed transmitter site. The map should include a scale of miles, a plot of the transmitter location, the identity of the community to be served and the location of all known radio stations, except amateurs, in the immediate vicinity.

Unless you are willing to devote a lot of time and possible expense into the preparation of an Environmental Impact Statement, stay away from constructing towers or support structures 300 feet or more in height. Also, stay away from existing or pending wilderness areas. Do not place your transmitter or earth station near buildings, structures, or objects which are significant to American history. If such structures are listed or elibgible for listing in the National Register of Historic Places, an Environmental Impact Statement will also be required. Locating facilities on or near areas of scenic or recreational value or in a flood plain could also require such a study.

In addition to these requirements, Federal Aviation Administration notification may also be required if you are proposing to construct or modify an existing structure extending more than 200 feet above the ground. If you are proposing a new tower to be lcoated within 5 miles of any type of airport, or if you are proposing to increase the height of an existing tower, FAA notification may also be required. You may wish to obtain an opinion letter from the FAA prior to filing your application. This can be done by contacting the regional office nearest you. If notification is required, this may be accomplished by filling out FAA Form 7460-1 obtainable from the FAA. If it is determined that your antenna site does have an impact on air navigation, clearance will take a long time.

Depending upon the type of construction you are contemplating and the laws in your area, it may also be necessary for you to obtain a local zoning approval or building permit. Often there is a fee associated with those permits based on the cost of construction. At the present time the FCC has no filing fees although this may change in the not too distant future.

Finally, special considerations may apply if you are contemplating low power operation in certain areas in West Virginia or Boulder, Colorado. In both of these cases, the government maintains tracking and transmitting facilities which could be sensitive to low power transmissions.

Channel Availability

Before applying for a station an "engineering channel search" is done for the community which is to be served. The purpose of that is to determine if there is an available channel in your area. That search identifies all nearby channels -- those within 220 miles or so -- to determine compliance with FCC channel spacing rules. These rules, which some believe are about as easy to understand as the U.S. tax code, set mileage limits on the spacing of stations to avoid interference between or among them. An accurate search can be done only with the precise geographic coordinates, latitude and longitude, for the transmitter location you have in mind.

You should be careful in this area. Just because there are no channels operating on or near to the channel you select does not mean that the channel is necessarily available for a low power or translator service. There are very specific rules limiting the filing possibilities for a given channel based on the nearby location of a channel which is 2, 3, 4, 5, 7, 8, 14 or 15 channels removed from the channel you propose using. For example, a station may not be possible in an area if another station 15 channels removed is located within 75 miles. Also, Channels 14 - 20 are used for both common carrier and private radio land mobile service in the sixteen largest urban areas. Either type service might preclude the use of one of those channels for low power service near the sixteen largest urban areas. Special problems are also encountered for applicants within 250 miles of the Canadian border or 200 miles of the Mexican border if an application proposes service at 1000 watts at a location not in the UHF table of assignments. While a few such applications have been accepted for filing, the FCC has indicated that future applications will be returned without processing. The reason is that bilateral agreements with these countries do not contemplate that type of facility, and renegotiations of these agreements have not been concluded.

Channel Selection

Selecting a channel may be quite complicated in some cases. Therefore, you may desire professional assistance with this part of the process.

In 1970, the FCC reallocated the band containing channels 70-83 to the land-mobile radio service. A low power application should not be made for these channels. Also, the existing FCC Rules require that a **UHF** translator applicant first look to channels 55-69 for a channel. The FCC has indicated that it

---

[1]**A television booster station is a low power station which receives a television signal on one channel, amplifies it and retransmits it on the same channel. A television translator is a low power broadcast station that receives a television signal on one channel, amplifies it, and transmits it on** another **channel.**

plans to change that rule. However, if you wish to apply for a UHF channel other than one between Channel 55 and 69, it is still necessary to include a request for waiver of the FCC's rules in your low power application. **An example of such a request is contained in Appendix 1.** The FCC also plans to eliminate its existing prohibition on VHF translators or low power stations in markets with operational UHF stations. Again, however, during the pendency of this rulemaking, and until the final rules are established, a request for waiver of this rule must be included in any low power application. **An example of the language which might be used in such a request is contained in Appendix 2.** It should be emphasized that because no low power applications have been granted, the type of showing required cannot be definitely specified. The language contained in the appendices should be used purely as a source for ideas.

There are no minimum mileage separation standards for VHF translators, and no mileage separations are proposed for low power in the VHF band. The VHF standard provides that a new facility will not be authorized where it is obvious that interference will be caused to an existing facility. **The low power applicant will have the burden of showing that interference will not be caused.** For UHF, the same minimum mileage standards apply as are used for full service stations unless a waiver of these standards is granted.

The following chart summarizes the Commission's VHF and UHF co-channel assignment and station separation requirements for full service stations as contained in Section 73.610 of the Rules.

Zone	Channels 2-13	Channels 14-69
I	170 miles	155 miles
II	190 miles	175 miles
III	220 miles	205 miles

For example, if you are in Zone 1 and wish to apply for Channel 14, absent a waiver, you cannot be located within 155 miles of another Channel 14. **To determine which zone you are in, see Appendix 6.** In general, however, Zone I consists of the northeasterly zone of the United States running through the Mid-West. Zone III consists of portions of those United States which is not located in either Zone I or Zone III and also includes Puerto Rico, Alaska, Hawaiian Islands and the Virgin Islands. It also should be noted that the minimum co-channel mileage separation between a station in one zone and a station in another zone is that zone of the lower separation.

In addition to the above co-channel spacing requirements, there are minimum adjacent channel separations applicable to all zones. **Adjacent** VHF Channels 2-13 must be spaced no closer than 60 miles. Adjacent channels 14-69 can be located no closer than 55 miles. Due to the frequency spacing which exists between Channels 4 and 5, between Channels 6 and 7 and between Channels 13 and 14, the minimum adjacent channel separations specified above are not applicable to these channel pairs.

There are special rules governing full service and translator or low power **UHF** stations. We shall set out some of these. The transmitter site of a UHF translator or low power station operating on a channel other than one listed in the television table of assignments shall not be located:

i. within 155 miles of a television broadcast station operating on an assigned channel which is the same as the requested channel;

ii. within 55 miles of a television broadcast station which is operating on an assigned channel which is adjacent to the requested channel;

iii. within 20 miles of a television broadcast station operating on an assigned channel which is the second, third, fourth, fifth or eighth channel above or below the requested channel;

iv. within 60 miles of a television broadcast station operating on an assigned channel which is the seventh or fourteenth channel above or below the requested channel;

v. within 75 miles of a television broadcast station operating on an assigned channel which is the fifteenth channel above or below the requested channel.

The distance specified is determined by measuring the distance betwen the **proposed site** of the translator or low power station and the **transmitter site** of the television broadcast station. In its **LPTV Notice**, the Commission has proposed several alternatives to compliance with these mileage standards. If, for example, you do not meet the mileage standard you may still apply for the channel but you must include a specific engineering showing. Some of the procedures for such a showing are set out in another FCC **Notice** of December 3, 1980, a Question and Answer pamphlet, contained in **Appendix 4**. A review of those procedures illustrates the necessity of obtaining professional advice in such instances. For example, the Commission sets out some procedures for providing a supplemental engineering showing. However, these procedures apply only to obtaining a waiver of certain UHF "taboos," which are FCC restrictions governing co-channel, adjacent channel, seventh, fourteenth of fifteenth channel spacing. The Commission does not provide guidance as to the type of showing required to obtain a waiver of the other UHF "taboos".

Programming Possibilities

Now that you have selected a site as well as a channel, you should consider the type of service you want to provide. There are many ways that the proposed new station may be programmed. For example, you may wish to sell programming to subscribers by contracting with one of the existing program suppliers whose signals are available on the Satcom, Comstar, or Westar satellites. You may install your own earth station and hook into your low power transmitter and encode or "scramble" the signal so it is not available to a non-subscriber. The subscriber would have a decoder at his or her residence. Another possibility, particularly if you are in a rural area with poor reception and limited cable services, is to arrange to provide the signal of a conventional station, scramble it and you provide the signal in a scrambled mode to the areas where it is not presently received and charge a fee to subscribers for the use of descramblers. To accomplish this you need a waiver of the FCC's Rules which currently prohibit stations from transmitting a scrambled signal. You would also need the approval of the station being re-broadcast. Another option is to program on a "stand alone basis," i.e., using locally produced programming which is taped or live. Under the FCC's proposals you are permitted to use a microwave link (STL) to transmit your programming from a studio to the transmitter. A separate application for FCC authority must be filed on FCC Form 313, if this is contemplated.

Several factors should be considered depending upon the type of service you are contemplating. First, if you intend to rebroadcast the signal of another broadcast station, Section 325(a) of the Communications Act of 1934 requires that you first obtain permission of the originating station. The FCC has held, however, that this consent cannot be unreasonably withheld. You may also have to obtain copyright clearances. Copyright is also a significant issue if you intend to retransmit programming from the satellite. It must be remembered that full copyright liability exists for retransmission of pay-TV services available on the satellite.

You may also wish to assemble your own package of programming purchased from motion picture suppliers and intersperse this programming with material of uniquely local interest such as high school sports or city council meetings. Care and attention should be paid to the costs involved in this type of programming. Another alternative is to contract with one of the growing number of program packagers for professional advice.

Position of the Program Suppliers

As another option you may wish to contact one or more of the cable television programming supply services. Because the proposed low power service is so new, we do not yet know whether the major cable TV program suppliers or broadcasters will sell programming to this service. Some of the major suppliers have refused to sell their services to anyone but a cable or multipoint distribution system (MDS) operator. Also a few of the "super stations" may refuse retransmission consent or condition that consent on the service being provided **without** a fee. It must be emphasized that the attitudes of program suppliers may change without notice. Also, as this service grows, so will the desire of the program suppliers to obtain revenue from it. To assist you in the effort we have attached as **Appendix 3** addresses and telephone numbers of a dozen program suppliers to the cable industry in the event you select this alternative for programming your station. It must be emphasized that this list is far from complete, with new entrants rapidly coming on line.

Waiver Requests

Depending upon the specific type of service you are planning, it will be necessary to prepare and file various requests to waive the FCC Rules because the applications now being accepted are done so under interim regulations. The rules that still are in existence contemplate a traditional translator service. If, for example, you are planning a pay TV service you should include a request that you be permitted to "scramble" the transmission by one of the methods authorized by the FCC so as to help to ensure privacy of the communication. At the present time, the FCC Rules do not allow such scrambling but in its October 17 **Notice**, the Commission proposed to change these rules. The present rules are designed to permit only the retransmission of broadcast signals. Another waiver is, therefore, necessary to originate your own programming. In your waiver request you must state why your service would be in the public interest. Depending upon what channel you select, a further waiver of the UHF spacing regulations may be required (See **Channel Selection Section**.) You may also wish to apply for greater power than is presently authorized. Attached as Appendices is sample language you may wish to consider in filing your waiver requests.

Ownership Requirements

Existing FCC Rules governing translator licenses contain several ownership eligibility restrictions. In general, a commercial television broadcast station cannot own or support a VHF translator in a distant television market. A cable television system cannot own a translator licensed in the same community as the system. Translators operating at a maximum permissible power are usually authorized only to the licensee of the television broadcast station to be retransmitted unless you can demonstrate that you have capable technical personnel available to ensure quality transmission and non-interference to other stations. There is also the requirement that, without a waiver, no one may operate a VHF translator in an area receiving satisfactoryservicefrom a UHF full-power station or a UHF translator. Also, there are limitations on foreign ownership; generally, only 20% of such a station may be owned by someone who is not a U.S. citizen.

The FCC proposes to retain **a few** of these rules in revised form while eliminating others. It proposes to permit cross-ownership between cable television and traditional translators. It does not propose to permit a cable television system to own a low power station which originates programming in the cable television franchise area. The FCC does not propose to permit a cable system to own either a translator or a low power station that broadcasts scrambled signals. It proposes to prevent a full service television station from owning a low power station in its own service area. It also intends to prevent any of the national networks from owning low power stations.

The FCC also intends to apply its "duopoly" (overlapping coverage) and "one-to-a-market" rules (one medium to a market) in a manner similar to the way these rules are applied to full power television and radio broadcasting. For example, the FCC proposes to deny a license to any entity already owning a station in the low power or in any other broadcast service, where that would result in a primary service contour overlap of the two stations as defined in the Commissions Rules. Section 73.636 of those Ruels states that:

> No license...will be granted...(if the applicant)...directly or indirectly, owns, operates or controls: one or more television broadcast stations and the grant of such license will result in any overlap of the Grade B contours of the existing and proposed stations, computed in accordance with Section 73.684; or one or more standard broadcast stations when the grant of such license will result in the Grade A contour of the proposed station, computed in accordance with Section 73.684, encompassing the entire community of license of one of the standard broadcast stations, or will result in the predicted or measured mmV/m ground wave contour(s) of the standard broadcast station(s), computed in accordance with Section 73.183 or Section 73.186, encompassing the entire community of license of the proposed station, or one or more FM broadcast stations and the grant of such license will result in the Grade A contour of the proposed station, computed in accordance with Section 73.684, encompassing the entire community of license of one of the FM broadcast stations, or will result in the predicted 1mV/m contour(s) of the FM broadcast(s), computed in accordance with Section 73.313, encompassing the entire community of license fo the proposed station; or a daily newspaper when the grant of such license will result in the Grade A contour, computed in accordance with Section 73.684, encompassing the entire community in which such a newspaper is published.

The FCC does not at the present time propose to place a ban on regional concentration of control as it has done in the broadcast services. It also does not propose to limit a single owner to any given number of applications, although it states that it will grant no more than 15 to any given applicant until the rules are finalized.

Procedures / Deciding Between or Among Conflicting (Mutually Exclusive) Applications

When two different applicants proposing full power broadcast service apply for a station on the same channel in the same area the Commission can only grant one application because if both were granted they would interfere with one another. These are termed **mutually exclusive applicants**. The process for deciding between them is sometimes extremely costly and time consuming. The FCC is trying to avoid this procedure in the case of low power television. It proposes that: any party filing a mutually exclusive application be notified, and given 30 days to amend its application specifying other facilities. If the party did not amend, the FCC staff would have authority to attempt to work out an agreement between the parties in a "predesignation conference." If this does not work, a "paper hearing" is proposed. In such a hearing, applicants would present written evidence concerning: their basic qualifications; the conformity of their applications to the FCC Rules; and three comparative criteria. The three comparative criteria would be of equal weight and would be cumulative toward a preference for a particular applicant.The following wouldapply whereone or more parties filed for the same channel in the same service area, or for channels that would otherwise conflict. The applicant that

first filed a complete and sufficient application would receive a preference. The applicant under **minority ownership** and control greater than 50% would receive a preference. Finally, the **non-commercial** applicant proposing a non-commercial service for the general public would receive a preference.

The FCC proposes to totally eliminate from consideration in a mutually exclusive proceeding an applicant that owns a cable television system in the given community to be served. The "paper hearing" in a contested case would end with the FCC Determining which of the applicants are basically qualified to operate the station. Of the qualified applicants, the one with the most comparative preferences would be awarded the authorization. If the use of the three comparative criteria did not disclose a "winner", the authorization would be awarded by a lottery, with each applicant having an equal chance to receive the authorization. The Commission does not at the present time propose to apply these preferences in the case of a contested license renewal. It should also be noted that at least one of these preferences - the first applicant filing - could only be earned by the first applicant filing a complete and sufficient application. Until the FCC finishes its rulemaking, the criteria for judging a complete application cannot be stated with any certainty. Therefore, this preference will not operate until the FCC's final decision in this low power rulemaking.

FCC Processing Procedures

Once you file the application, do not expect it to be granted the next day. The Government does not work that way, yet. Typically, after the application is received, it is given a quick once-over. If there is a problem it is usually returned to the applicant with a note identifying the problem. If it appears generally acceptable, it is placed on a "cut-off list." This list is published by the FCC in the **Federal Register**. For thirty days after it is placed on the cut-off list, the application sits and others are given the opportunity to object to it, or file their own application to serve the same area on the same channel, or on a channel that is affected by the cut-off application. Recalling the discussion of UHF channel selection, the fifteenth channel away could be among the channels affected. If no one files during the time period specified on the cut-off list and if the FCC does not find anything wrong with the application, you may expect a grant **within several months**. If a competing application is filed, it is likely that both applications will sit until the FCC determines how to decide between two mutually exclusive applicants.

Factors Affecting The Time To Grant

Because the FCC's proposal is new and no commercial operations have yet been authorized, the time lag between filing the application and grant of an authorization is merely conjecture at this point. However, it is expected that the FCC will grant the first low power applications by the time we have gone to press with this manual. If someone else applies on top of you, it will take longer, of course. The FCC would have to choose between you and the other applicant and the final criteria that will be used for this selection are still being debated. Therefore, processing of mutually exclusive applications may take a considerable period of time. The time required may also be increased by the budget and personnel cuts the FCC is presently undergoing. It may become advantageous for mutually exclusive applicants to form joint ventures instead of "fighting it out." Such a venture itself would have to be approved by the FCC. Lastly, the more isolated your proposed station, the less likely it is that you will be duplicated or protested and the grant will likely come sooner.

Transferability of Licenses

Another point. What if after you have filed your application and been granted a license your plans change and you do not wish to build the station? What can be done to recoup the investment you have already made? **Under the proposed rules** you can sell your permit to the highest bidder and pocket any profit. This is a significant departure from the rules governing full power television service which require that the license be held for three years before it can be sold for a profit.

Publication Requirements

Once you have prepared and filed your low power translator application, the FCC Rules require that local publication be given for that application. That notification should be given at least once during the two-week period immediately following the filing of such application or a major amendment to it. It should be given in a daily, weekly, or bi-weekly publication having general circulation in the community or area to be served. If there is no publication of general circulation in the community or area to be served, the applicant should determine an appropriate means of providing the required notice to the general public, such as posting in the local post office or other public place.

Here again the final rules for low power stations have not yet been established. However, existing translator rules require that the notice contain the following information:

1) The name of the applicant, the community or area to be served, and the transmitter site.
2) The purpose for which the application was filed (whether the application is for a new translator station, for authority to make changes in an existing translator station, for assignment or transfer of control, renewal, etc.)
3) The date when the application or amendment was filed with the Commission.
4) The output channel or channels on which the station is operating or proposes to operate and the power used or proposed to be used.
5) In the case of an application for changes in authorized facilities, the nature of the changes sought.
6) In the case of a major amendment to an application, the nature of the amendment.
7) A statement that the station engages in or intends to engage in rebroadcasting, and the call letters, location and channel of operation of each station whose signals it is rebroadcasting or intends to rebroadcast.
8) Also, within 7 days of the last day of publication or broadcast of the notice required by...this section, the applicant shall file a statement with the Comission setting forth the dates on which the notice was published, the text of the notice, and/or, where applicable, the dates and times that the notice was broadcast and the text thereof. When public notice is given by other means, the applicant shall file, within 7 days of the giving of such notice, the text of the notice, the means by which it was accomplished and the date thereof.

Words of Caution

Several words of caution should be noted if you are thinking about low power television. First, everything we have talked about so far concerns **proposed** rules. It is not yet the law. The FCC has said,"We think this is a good idea; what do you think?" They have requested input from the public concerning low power television. There is no assurance that all or any of these proposals will ultimately be adopted. Nevertheless, **the Commission has permitted the filing of applications as if the interim procedures were the law**. But it cautions applicants that these interim procedures may not be the Rules eventually adopted for low power television.

Already, a few parties such as the National Association of Broadcasters and the Corporation for Public Broadcasting have filed comments expressing their disapproval of the Commission's low power proposals. Earlier this year a court stay was issued over one part of the proposal, only to be withdrawn a few days later. As with any major FCC decision

there may be court appeals which could reverse whatever course of action the Commission takes.

Also, if a full power station goes into operation near you on the channel that you have selected and you cannot find another available channel, it is likely that you will be out of business. If you cause harmful interference to a full power station and it cannot be corrected you may also be out of business. The FCC has said that low power TV stations will, in effect, have secondary status to full power television.

Finally, if you are interested in filing for one or more of these channels, you should realize that you are not alone. **Over 3,000 applications have already been filed.** The interest generated in this new service is because it is considered not the new, but the **last** frontier in broadcast television.

SECTION TWO

How to Complete the FCC Translator and Low Power Televison Form

The FCC has indicated that in the near future it intends to adopt a special form for low power television. The definition of near future is not clear; it could take a long time. Believe it or not, new government forms go through an elaborate clearing process. At the present time, **FCC Form 346** must be used to apply for low power as well as translator stations. There are several editions of this form that are presently in use. The most current version is dated February, 1980. The August 1978 edition may still be used.

From 346 consists of six pages and a number of exhibits which must be completed. This form consists of three sections which request: general information; legal and financial information; and, engineering data. An original and two copies should be filed with the Federal Communications Commission at the Office of the Secretary, 1919 M Street, NW, Washington, D.C. 20554. Each exhibit to the Form should be numbered and dated.

If you have already supplied some of the information required by Form 346 or are filing multiple applications and have included all the information on one main application, you need not refile all of that information. First, you must identify fully by reference to the file number, the FCC Form number and the filing date of the application containing the information and the pertinent page or paragraph. After making that reference, you should state, "There has been no change since the date of that filing." Or, if there has been such a change, you should specify that fact as well as note the change.

Answers to Specific Questions on FCC Form 346

Page I

Question 1. - **Name of applicant**

The name of the applicant should be submitted in the following manner for the various entities:

Individual: Enter the individual's name and the name name under which the individual is doing business.

Partnership: Enter the names of all the partners and the name under which the partnership is doing business.

Corporation: Enter the exact corporate name.

Association: Enter the name of the association and the name of an executive officer along with his/her title.

Government Entity: Enter the full name of the government entity. Be certain that the entity is eligible to hold a broadcast license.

Question 2. - **Name and Address of Person to Whom Communication should be sent if different from Item 1.**

If you wish correspondence from the Commission to go to someone other than the applicant, the name of such person should be included in response to Question 2, along with his/her street address, city, state, zip code, and telephone number, including area code. Typically this section is used to supply the name of the applicant's attorney or engineer or a partner or other part owner of the applicant where his/her address is different from that filed in response to Question 1.

Question 3. - Purpose of the application.

Those intending to construct and operate a new low power or translator station should check the first box in response to Question 3. Those wishing to modify an existing construction permit or license should check the second box.

3. Purpose of application (check one)
[X] Construct a new station
[ ] Modify an existing authorization

Question 4. - **Authority to make changes in existing station.**

Question 4 should be completed only if you are applying to make changes to an existing station. If you are applying for a new low power or translator station, this question should be answered N/A. If you are applying to make changes to an existing station you should specify the transmitter output power and the call sign of the existing station along with its principal community(ies) served and the city and state in which it/they are located. If the application is for changes to an existing authorization, Section 1 should be completed and care should be taken to check the paragraph numbers which are to be changed and those which will remain the same in response to Question 4(b).

Question 5. - **Retransmission authority from the primary station.**

If you are the licensee of a commercial broadcast station which you are seeking to retransmit, then Question 5(a) should be checked "Yes." If you are proposing translator (rebroadcast) service but you are **not** the licensee of the primary station, then the box labeled "No" should be checked and Question 5(b) should be answered, which asks you to indicate whether written authority has been obtained from the licensee of that station. The Communication Act requires that such authority be obtained. **The FCC has also indicated that it cannot be unreasonably refused.** If you are proposing a translator service, it is helpful to include such written authority with the application as an exhibit.

5.(a) Is applicant the licensee of primary station?	
[ ] YES N/A	NO
5.(b) If answer to 5(a) is No, has written authority been obtained from the licensee of the station whose programs are to be retransmitted?	SEE EXHIBIT # 3
YES	[ ] NO

If other low power services, such as pay TV service or non-broadcast programming available on one of the domestic satellites, is intended, Question 5(a) should be responded to by an "N/A". An exhibit should be provided in which you set out your programming plans. It is **not necessary** to conclude a contract with a non-broadcast program supplier prior to filing a low power application proposing pay TV.

Question 6. - **Station identification.**

Existing Commission rules require that you periodically identify your station when it is on the air. The translator as well as proposed low power rules will probably carry over this requirement. Question 6 asks the means by which such identification will be accomplished. The available options are amplitude modulation of the FM aural carrier, FSK (frequency shift keying) - or by the primary station in the case of translator service. The appropriate box should be checked. In the event that station identification is given by a different method, the method used should be specifically set out. The FCC has indicated it will be liberal in authorizing different means for station identification. For example, some applicants propose the use of a character generator.

Page 2.

Section 1, page 2 requires that the application be signed and dated and that the name of the applicant and his/her title be provided. Your application will be sent back by return mail if these requirements are not fulfilled. The statements contained in this section should be read carefully before signing. The application must be personally signed by the applicant if the applicant is an individual, by one of the partners if the applicant is a partnership, by an officer if the applicant is a corporation, or by a member who is an officer if the applicant is an unincorporated association. It should be signed by a duly elected or appointed official as may be competent to do so under the laws of the applicable jurisdiction if the applicant is an eligible government entity. It should be signed by the applicant's attorney in the case of the applicant's physical disability or his/her absence from the United States. In that event the attorney must sign for the applicant separately and set forth the reasons why the application is not signed by the applicant. If any of the information is stated on the basis of the attorney's belief only, rather than knowledge, he or she must separately set forth the reasons for believing such statements are true. The FCC states that willful false statements on this Form are punishable by fine and imprisonment under the U.S. Code, Title 18, Section 1001.

Page 2 also contains a space to list exhibits that are furnished as a part of the application. This list should be completed after the application has been completed. Provide the exhibit number, the paragraph number on the Form 346 to which the exhibit refers, together with the name of the officer or employee by whom or under whose direction the exhibit was prepared and that individual's official title. Typically, portions of the exhibits will be completed by the applicant or an officer of the applicant as well as by a consulting engineer and/or an attorney.

Page 3
Section II

Legal Qualifications

Question 1 - **Legal Status**

Question 1, Section II of Form 346 asks the legal status of the applicant. In response to Question 1, you should indicate by checking the appropriate box whether the applicant is an individual, general partnership, limited partnership, corporation, unincorporated association, governmental entity or other.

Question 2 - **Laws of Organization**

If the applicant is not an individual, the State, district or territory or possession under which it is organized should be included in response to Question 2.

Question 3(a) - **Ownership of the Applicant**

Question 3(a) requires that Table 1, Section II, page **3** be completed. This is somewhat confusing because this table is **actually found on page 5** of the Form. If the applicant is an individual, Column A and B should be filled out in that table stating the applicant's name and residence address and the applicant's individual interest, e.g., sole proprietor. If the applicant is a partnership, Columns A and B should be filled out specifying each general or limited partner, including silent partners, giving the names and resident addresses of each. It should also include the nature of the partnership interest, i.e., whether general or limited. If the applicant is an unincorporated association or a corporation, Columns A and B should be filled out providing the names and residence addresses of all officers and directors or other members of the governing board and specifying the offices held.

Question 3(b) and 3(c) - **Interest in Other Commuication Properties**

If the applicant or any officer or director of the applicant has had any interest in or connection with any AM, FM, television, television translator or FM translator station, Question 3(b) should be checked "Yes". If this is the case a separate exhibit should be prepared specifying the nature of that interest. The appropriate reference to that exhibit and all others should be included in the appropriate space on Section I, page 2. If the applicant or any officer of the applicant presently has an interest in a cable television system, Question 3(c) should be checked "Yes". Again, the particulars of that interest should be specified ina separate exhibit.

Questions 4 - 6. - **Citizenship and Other Statutory Re Requirements**

Questions 4 - 6 request specific information concerning the citizenship of the applicant, whether the applicant or any principal party to the application has had a station license revoked or has been found guilty of various crimes or offenses under the laws of the United States. It is difficult, if not impossible, to become a Commission licensee if one has a criminal record, and a communications law attorney should be consulted. These questions should be carefully read and research done, if necessary, to answer them accurately (for example, by polling a board of directors). Both the Communications Act and Commission Rules limit foreign ownership of broadcast stations. They also forbid foreign directors and officers. A "principal party to this application" is defined in the Commission's Form as (a) in the case of an individual applicant, the applicant; (2) in the case of a partnership applicant, all partners including limited and silent partners; (3) in the case of a corporate applicant, all officers and directors; and, (4) in the case of any other applicant, all executive officers and members of the governing board. If the "Yes" box is checked for any of the sub parts contained in Questions 5 - 6, a specific exhibit providing for full disclosure concerning the persons and matters involved and identifying the Court and the proceeding by dates and file numbers should be included. All facts upon which the proceeding was based and the nature of the offense committed and the ultimate dispostiion of the matter should also be included as a separate exhibit.

Question 7. - Corporate control.

Question 7 should be answered only if the applicant is a corporation. In the event that it is controlled by another corporation, the box corresonding to "Yes" should be checked. If it is other than a corporation, Questoin 7 should be responded to with an N/A.

Question 8. - **Corporate family.**

Question 8 should be checked "yes" only if the corporation or the other legal entity named in Question 7 is itself a subsidiary. In that event, Table 1, Page 3, Section II should be

3. a. Complete Table 1 on page 3 of Section II	
b. Does applicant or any principal party (officer or director) to this application have now, or has applicant or any such party had, any interest in, or connection with, any standard, FM, television, television translator, or FM translator station?	☐ YES ☒ NO
If the answer is "Yes", show particulars in Exhibit No.	
c. Does applicant or any officer or director thereof now have any interest in or connection with a cable television system (CATV)?	☒ YES ☐ NO
If the answer is "Yes", set forth particulars in Exhibit No. 4	

filled out for each company involved, including the organization having final control of the station.

Question 9. - **Control of facilities.**

Commission rules require that the applicant must maintain absolute legal control of the station. If the applicant is proposing to contract with another entity to, for example, perform maintenance functions, or if there would be restrictions on the applicant's entrance to the transmitting facilities, this information should be fully set out in an exhibit to the Form and referenced in response to Question 9.

Question 10. - **Environmental statements.**

If your application is deemed a major action under Section 1.1305 of the Commission's Rules, you should place a Check in the "Yes" box in response to Question 10. We have previously summarized some of the factors which trigger a major action pursuant to that Section of the commission's rules. See Section on **Site Selection**. If the application does not propose a major action, Question 10 should be responded to by a Check in the box labeled "No." In this event a brief explanation should be included. If you are proposing to use an existing structure on which to place your antenna, for example, you should state this fact in response to Question 10.

Question 11 - **Financing the Costs of Construction**

Unless you are proposing a minor modification costing less than $500.00 you are required to provide a "detailed showing as to how the cost of construction and operation of the proposed station will be financed." The statement should be clear, concise and all-encompassing. It is recommended that you include equipment financing contracts which you have entered or bank commitment letters which have been obtained.

Question 12. - **Costs of Construction and Operation**

You are required to provide an estimate of the costs of equipment and the expense to operate the station for three months unless the total costs involved are under $500.00. The Form says one year, but the requirement has been changed. These may be obtained from your financial projections. You may wish to set this information out in a separate schedule. In the event you plan to install an earth station **this cost should be included.** Also included should be the costs of personnel operating the station and other expenses such as programming, equipment, maintenance and insurance.

Question 13. - **Balance Sheet**

In order to demonstrate that you have the necessary funds to construct and operate the station, the FCC requires that you provide a balance sheet or other financial statement which is current. The information must be accurate within 90 days of the filing. If the partnership or corporation which is applying does not have much in assets, the Commission will probably accept the individual balance sheets of the partners or owners. The required balance sheet does not have to be audited or prepared by an accountant. All the FCC is seeking to determine is whether there is a reasonable assurance that sufficient funds will be available.

Question 14. -**Funding by TV or FM station.**

Question 14 should be answered by an "N/A" unless you are applying for a VHF Television or FM translator service. If this is the case you must indicate if anything of value has been furnished to you directly or indirectly by the licensee or permittee of any TV or FM broadcast station or anyone associated with such a station. If it has, a separate exhibit must be included giving details of the assistance.

Section III, page 1 - Engineering Data

It is recommended that the engineering data contained in Questions 1 - 5 of Section III, page 1 should be filled out only by a knowledgeable broadcast or communications engineer.

Question 1. - **Facilities Requested.**

The output channel specified by Question 1(a) is the channel for which you are applying. If, for example, your engineering showing has indicated that you may apply for Channel 40 in your community, that channel should be specified. The frequency in MHz for that channel is 626-632. This information should be filed in response to Question 1(a) on the Form. The frequency in MHz for each of the Channels 2 - 69 may be found in Table 1.

Table 1

Channel Number	Frequency Band (MHz)	Channel Number	Frequency Band (MHz)
2	54-60	18	494-500
3	60-66	19	500-506
4	66-72	20	506-512
5	76-82	21	512-518
6	82-88	22	518-524
7	174-180	23	524-530
8	180-186	24	530-536
9	186-192	25	536-542
10	192-198	26	542-548
11	198-204	27	548-554
12	204-210	28	554-560
13	210-216	29	560-566
14	470-476	30	566-572
15	476-482	31	572-578
16	482-488	32	578-584
17	488-494	33	584-590

Section III, Page 1

ENGINEERING DATA

1. Facilities requested:

a. Output Channel No.: 4
Frequency: 66-72 MHz

Transmitter Output Power: 10 WATTS

Proposed Principal Community or Communities to be served:
City: LITTLE GULCH
State: OHIO
Estimated total population to be served: 712

Primary Station (station to be rebroadcast)
Call: Channel No.
City: N/A
State:
Frequency: MHz

b. Input Channel No.: N/A
Frequency: MHz

If station is to operate via another translator station, indicate call sign and location of final intermediate translator:
N/A

34	590-596	59	740-746
35	596-602	60	746-752
36	602-608	61	752-758
37	608-614	62	758-764
38	614-620	63	764-770
39	620-626	64	770-776
40	626-632	65	776-782
41	632-638	66	782-788
42	638-644	67	788-794
43	644-650	68	794-800
44	650-656	69	800-806
45	656-662	70	806-812
46	662-668	71	812-818
47	668-674	72	818-824
48	674-680	73	824-830
49	680-686	74	830-836
50	686-692	75	836-842
51	692-698	76	842-848
52	698-704	77	848-854
53	704-710	78	854-860
54	710-716	79	860-866
55	716-722	80	866-872
56	722-728	81	872-878
57	728-734	82	878-884
58	734-740	83	884-890

Question 1 (b) requires that the **input channel** number be specified. This question is relevant only if a translator type service is contemplated. If, for example, your intention is to translate Channel 18 to Channel 40, Channel 18 should be included in response to Question 1 (b) with a frequency of 494-500 MHz included. Again, the frequency in MHz may be determined in accordance with Table 1. The transmitter output power should also be specified in response to this question. At present the rules are in a state of flux as to the output power which may be requested. The Commission has indicated, however, that if you are attempting to obtain more than 1000 watts UHF or 100 watts VHF, your application may be returned without processing. Special considerations apply if you are seeking 1000 watts UHF or 100 watts VHF. In such event, parts 1, 2, 73, 74 and 17 of the Commissions Rules and Regualtions, along with the LPTV **Notice** and other related documents should be consulted. It will be necessary to file for a waiver of FCC Rules in such cases unless you are proposing to operate on an assigned channel in the TV Table of Assignments. The remainder of Question 1 is self-explanatory with one exception. In the event that low power service is contemplated, the applicant should place an N/A adjacent to that portion of Question 1 which asks the call sign, channel number and city of the primary station. Reference should also be made in response to this section of Question 1 to the exhibit in which the specifics of the applicant's service are set out.

Question 2. - **Proposed Transmitter Location**

The city, county and state where the proposed transmitter is to be located should be set out in response to Question 2. In addition, the address or other description of the location should be included. If, for example, the transmitter is to be located on an antenna farm, you should specify this fact. Of particular importance in response to this section are the geographical coordinates of the transmitting antenna to the nearest second. **These coordinates should be double-checked to ensure that they are accurate.** Also, a map of the area of the proposed transmitter location should be included. The Commission has stated that it prefers a topographic map such as the US Geological Survey quadrangle (7.5 minute series) for the area. In any case, the map should contain a scale of miles, the proposed transmitter location accurately plotted, the principal community to be served by the proposed station clearly identified and labeled and the locations of all known radio stations (except amateur) such as AM, FM, TV, translator, police, fire, aeronautical, public utility within the immediate vicinity of the proposed transmitter location.

Questions 3 - 5. -**Transmitter, Antenna and Transmission Line.**

Questions 3 - 5 are self-explanatory and should be filled out by a qualified broadcast engineer.

Question 6. - **Vertical Plan Sketch**

A sketch or drawing of the proposed transmitting structure, including any supporting structures and the given height of the center of radiation above ground should be included in response to Question 6. The overall height of the structure above-ground, including any lighting beacons and the height above mean sea level in feet for all significant features for the transmitting antenna should also be included. The Commission's Form requires specific information with respect to receiving antennas also. In the case of a low power or translator service, specific information on the receiving antennas probably cannot be supplied at the time of the initial application and this fact should be mentioned in response to Question 6.

Question 7. - **Sharing of Facilities**

Question 7 should be checked "yes" if the applicant

3. Transmitter:

Make	Type No.	Rated output power (watts) P
ANDERSON SCIENTIFIC	TVT-10	10 WATTS

4. Transmission line:

Make	Type No.	Length	Rated efficiency E for length given (decimal fraction)
TIMES WIRE	412GL.	100'	.82

5. Transmitting antenna

Make	Type No. 1/	Description 1/	Power gain G (multiplier) in lobe of maximum radiation relative to a half-wave dipole
JERROLD/TACO	JSS-4	5 ELEMENT YAGI	10 dB

Orientation 2/	Height above ground 3/	Elevation of Site 4/	Elevation of Community 5/	Effective radiated power R (R = P × E × G)
ENE/ 75° TRUE	30'	481	405	R = 10 X .82 X 10 R = 82 WATTS

proposes to share the transmitting tower with another station or stations of any class. If such sharing is contemplated the call signs and class of such other station(s) should also be provided.

Question 8. - **Information Respecting Modification of An Existing Station**

Question 8 does not apply to a new application for low power or television translator stations. It applies only to modification of a translator station.

Question 9. - **Polar Diagram Required**

In response to Question 9, a polar diagram of the radiation pattern of the transmitting antenna should be included as an exhibit. These are frequently supplied in the catalogues of the major antenna manufacturers. The applicant should include a polar diagram which specifies the relation between the major lobe or lobes and minor lobes of radiation. This information may be obtained from the manufacturer. If an omnidirectional transmitting antenna is contemplated, the appropriate box should be checked in response to this question and the polar diagram omitted.

Question 10. - **Terrain Features**

If there are any major obstacles which block the principal community to be served, this fact should be brought to the Commission's attention by a check in the "yes" box of Question 10. These may include hills, mountains, tall buildings or towers. In such event, a description of the extent of the area affected should be provided to the Commission. This may be done in a separate exhibit which is referenced in response to Question 10.

Question 11. - **Co-Channel and First Adjacent Channel Translator Stations.**

Any co-channel or first adjacent channel translator stations existing or authorized **within 15 miles** of the proposed site should be specifically set out in response to Question 11. In addition, the application should specify whether the transmitter location meets the mileage separation requirements of Section 74.702 of the Rules. If the answer to that question is no, a separate exhibit should be set out asking for a waiver of the rules and justifying that request by an appropriate engineering showing. In any case, a list of the assignments and channel allocations considered should be included as a separate exhibit in response to Question 11.

Question 12. - **FAA Notification**

If FAA notification has been provided, this fact should be brought to the Commission's attention by checking the "Yes" box in response to Question 12. Some of the factors requiring FAA notification have been previously discussed. See **Site Selection**. Here again for a complete treatment, FCC rules should be consulted. If you are proposing to construct a tower over 200 feet, extend an existing tower over 20 feet or are located anywhere near an airport, FAA notification may be required.

Question 13. - **Unattended Operation**

You should specify whether unattended operation is proposed by checking the appropriate box in response to Question 13. You should be aware that while unattended operation is permitted for translators that do not originate programming, the Commission is proposing to require some type of attended operation in the case of low power origination services. The ability of the FCC to waive its rules in this area is extremely limited because the operator attendance requirement is contained in the Communications Act and can only be changed by Congress. In response to Question 13(b), the name, address and telephone number of the person or persons who may be contacted in an emergency to suspend operation of the station should be provided. This person may include the local maintenance operator or the individual designated to attend the transmitter. Some applicants have responded to this question by stating that the name of such person will be supplied upon grant of the construction permit.

Lastly, the individual who supervises the inclusion of the engineering information required should sign the application at the bottom of Section III, page 2 (FCC Form 346, page 7). Also include the capacity in which he is signing the application, date, and telephone number, including area code.

SECTION III

APPENDIX 1 *

LANGUAGE FOR WAIVER OF FCC RULES TO PERMIT CHANNEL SELECTION BY THE APPLICANT

Section 74.702(c)(1) and 74.702(d) presently require that a showing must be made that it is not possible to apply for a channel between Channels 55 - 69 in order to apply for a lower UHF channel. The rules also require that in the event that no channels are available between Channels 55 - 69 that the highest channel must be selected between Channels 14 - 54. Waiver of these provisions is requested.

In support thereof, the following is provided. In its **Low Power Notice**, the Commission has indicated its intent to eliminate these restrictions. The Commission has stated that elimination of these requirements will promote more efficient use of UHF services. We agree with that conclusion. The engineering showing required for compliance with the Sections also places an unnecessary burden on the applicant. Analyzing these requests places a burden on the Commission's limited resources. The choice of the channel in question should be up to the operator provided he/she does not cause any interference to other services and that choice is consistent with the Commission goals for spectrum conservation.

APPENDIX 2

LANGUAGE FOR WAIVER OF FCC RULES TO PERMIT VHF STATION IN UHF MARKET

Existing Commission rules do not permit licensing of VHF translators or low power stations in markets that include UHF. Applicant herein respectfully requests a waiver of this requirement. In support thereof the following is shown.

In paragraph 49 of its Low Power **Notice**, the Commission has indicated its intent to eliminate this requirement. We agree with the Commission's finding that the benefits of a deintermixed local market are not risked as a result of secondary 10 watt and/or 100 watt VHF stations. In addition, waiver of this requirement may reduce costs to the public by permitting lower cost equipment. Such a cost reduction may inure to the direct benefit of the public, a result clearly in the public interest.

APPENDIX 3

Partial List of Program Suppliers
And Programming Available on Satcom I

Video Program	Contact for Information	Addres
BET	202/337-5206	Suite 300, Prospect Place 3222 N. Street, Northwest Washington, D.C. 20007

***The language proposed in Appendix 1, 2, 4 and 5 is representative of the type of showings which have been supplied to the FCC. Because no such waivers have been granted, it is impossible to say with any accuracy the extent of the showing which is required. Applicants should set out their own circumstances in attempting to obtain a waiver, not merely rely on the language contained in these Appendices.**

CBN	804/424-7777	CBN, Virginia Beach, VA 23463
CNN	404/898-8500	1050 Techwood Dr., N.W. Atlanta, Georgia 30309
C-Span	703/525-3030	3800 N. Fairfax Arlington, Virginia 22203
ESPN	203/584-8477	ESPN Plaza Bristol, Connecticut 06010
Galavision	212/953-7550	250 Park Avenue New York, New York 10017
HBO	212/484-1715	Time-Life Building Rockefeller Center New York, New York 10020
HTN	207/774-0300	465 Congress Street Portland, Maine 01101
The Movie Channel	212/944-4261	Warner Amex 1211 Avenue of the Americas New York, New York 10036
PTL	704/554-6080	7224 Park Road Charlotte, North Carolina 28279
Showtime	212/880-6621	1211 Avenue of the Americas New York, New York 10036
WGN	800/331-4806	United Video 5200 S. Harvard Suite 215 Tulsa, Oklahoma 74135

APPENDIX 4

LANGUAGE FOR WAIVER OF FCC RULES TO PERMIT SCRAMBLED TRANSMISSIONS

To implement the proposed service, low power transmissions will be "scrambled" by one of the Commission approved methods. In such a manner security of the communications will be provided. To the extent required to implement service, the applicant specifically requests a waiver of Section 74.731(b)-(d) fo the Commission's Rules which restricts the uses of television translator stations and the ability to scramble transmisisons. In support thereof, the Commission, itself, has found that "this ban has retarded the growth of television service..." **Inquiry** in BC Docket 78-253, RM 1932; FCC 81-503; ___FCC 2d___, **Fed. Reg.** Vol. 45, No. 203, October 17, 1980. It found that permitting low power stations to scramble transmissions will "provide support for a larger and more diverse menu of television." **Id.** at para. 31.

In proposing this service the applicant will provide an additional source of programming to the community and add to diversity of viewing options available. Again, as the Commission noted "subscription television provides options and diversity unavailable from free television." **Id.** para. 31.

APPENDIX 5

LANGUAGE TO PERMIT PROGRAM ORIGINATION

Section 74.701(a) of the Commission's Rules provides that translator stations are intended for the purpose of "retransmitting the programs and signals of a television broadcast station..." It does not, by its terms, permit the transmission of origination programming such as that proposed herein. Accordingly, a waiver of this section of the Commission's Rules is requested.

Granting the waiver in question will increase the viewing choices available to consumers in the greater_____ area. The market is served, at present, by conventional television broadcast stations. At the same time there are very few opportunities to receive locally originated/subscription programming in the home. There is a strong demand for such services in the greater _____ area. A grant of this application will further the public interest and expand the viewing options available.

APPENDIX 6

Rules Section 73.609

(1) Zone I consists of that portion of the United States located within the confines of the following lines drawn ont he U.S. Albers Equal Area Projection Map (based on standard parallels 29½° and 45½°; North American datum); Beginning at the most easterly point ont he state boundary line between North Carolina and Virginia; thence in a straight line to a point on the Virginia - West Virginia boundary line located at north latitude 37° 49' and west longitude 80° 12' 30"; thence westerly along the southern boundary lines of the States of West Virginia, Ohio, Indiana, and Illinois to a point at the junction of the Illinois, Kentucky, and Missouri State boundary lines; thence northerly along the western boundary line of the State of Illinois to a point at the junction of the Illinois, Iowa, and Wisconsin State boundary lines; thence easterly along the northern state boundary line of Illinois to the 90th meridian; thence north along this meridian to the 43.5° parallel; thence east along this parallel to the 71st meridian; thence in a straight line to the intersection of the 69th meridian and the 45th parallel; thence east along the 45th parallel to the Atlantic Ocean. When any of the above lines pass through a city, the city shall be considered to be located in Zone 1. (See Figure 1 of Section 73.699.)

(2) Zone II consists of that portion of the United States which is not located in either Zone I or Zone III, and Puerto Rico, Alaska, Hawaiian Islands and the Virgin Islands.

(3) Zone III consists of that portion of the United States located south of a line drawn on the United States Albers Equal Area Projection Map (based on standard parallels 29½° and 45½°; North American datum), beginning at a point on the east coast of Georgia and the 31st parallel and ending at the United States - Mexican border, consisting of arcs drawn with a 150 mile radius to the north from the following specified points:

	North Latitude	West Longitude
(a)	29°40'00"	83°24'00"
(b)	30°07'00"	84°12'00"
(c)	30°31'00"	86°30'00"
(d)	30°48'00"	87°58'30"
(e)	30°00'00"	90°38'30"
(f)	30°04'30"	93°19'00"
(f)	29°46'00"	95°95'00"
(g)	28°43'00"	96°30'30"
(h)	27°52'30"	97°32'00"

SECTION IV

FCC FORMS AND PUBLICATIONS

Approved by GAO
B-180227(R0129)

Section I

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

APPLICATION FOR AUTHORITY TO CONSTRUCT OR MAKE CHANGES IN A TV OR FM BROADCAST TRANSLATOR STATION

Instructions

A. This form is to be used in applying for authority to construct a new TV or FM Broadcast Translator Station, or to make changes in an existing TV or FM Broadcast Translator Station. This form consists of this part, Section I, and the following sections:

Section II. Legal, Financial Qualifications

Section III. Engineering Data

B. Prepare three copies of this form and all exhibits. File all the above with the Federal Communications Commission, Washington, D. C. 20554.

C. Number exhibits serially in the space provided in the body of the form and list each exhibit in the space provided on page 2 of this section. Date each exhibit.

D. The name of the applicant stated herein shall be the exact corporate name, if a corporation; if a partnership, the names of all partners and the name under which the partnership does business; if an unincorporated association, the name of an executive officer, his office and the name of the association.

E. Information called for by this application which is already on file with the Commission need not be refiled in this application provided (1) the information is now on file in another application or FCC form filed by or on behalf of this applicant; (2) the information is identified fully by reference to the file number (if any), the FCC form number, and the filing date of the application or other form containing the information and the page or paragraph referred to, and (3) after making the reference the applicant states: "No change since date of filing". Any such reference will be considered to incorporate into this application all information, confidential or otherwise, contained in the application or other form referred to. The incorporated application or other form will thereafter, in its entirety, be open to the public.

F. This application shall be personally signed by the applicant, if the applicant is an individual; by one of the partners, if the applicant is a partnership; by an officer, if the applicant is a corporation; by a member who is an officer, if the applicant is an unincorporated association; by such duly elected or appointed officials as may be competent to do so under the laws of the applicable jurisdiction, if the applicant is an eligible government entity; or by the applicant's attorney in case of the applicant's physicaly disability or of his/her absence from the United States. The attorney shall, in the event he/she signs for the applicant, separately set forth the reason why the application is not signed by the applicant. In addition, if any matter is stated on the basis of the attorney's belief only (rather than knowledge), he/she shall separately set forth reasons for believing that such statements are true.

G. Before filling out this application, the applicant should familiarize himself with the Communications Act of 1934, as amended, Parts 1, 2, 73, 74, and 17 of the Commission's Rules and Regulations.

H. *BE SURE ALL NECESSARY INFORMATION IS FURNISHED AND ALL PARAGRAPHS ARE FULLY ANSWERED. IF ANY PORTIONS OF THE APPLICATION ARE NOT APPLICABLE, SPECIFICALLY SO STATE. DEFECTIVE OR INCOMPLETE APPLICATIONS MAY BE RETURNED WITHOUT CONSIDERATION.*

FOR COMMISSION USE ONLY

File No.

1. Name of applicant (See Instruction D)

Street Address

City | State | ZIP Code

Telephone (include Area Code)

2. Name and address of person to whom communications should be sent, if different from item 1

Name

Street Address

City State ZIP Code

Telephone (include Area Code)

3. Purpose of application (check one)

[ ] Construct a new station
[ ] Modify an existing authorization

4. If authority to make changes in an existing station is required:

a. Present facilities

Specify transmitter output power, and your call sign:

Principal Community or Communities served:
City State

b. If this application is for changes in an existing authorization, complete Section I of this form and any of the paragraphs necessary to show all substantial changes in information filed with the Commission in prior applications or reports. In the spaces below check Paragraphs submitted herewith and as to Paragraphs not submitted herewith refer to the prior application containing the requested information in accordance with Instruction E.

Paragraph No.	Reference (File or Form No. and Date)
[ ] 1 through 14 of Section II	
[ ] 1 through 12 of Section III	

5.(a) Is applicant the licensee of primary station?

[ ] YES [ ] NO

5.(b) If answer to 5(a) is No, has written authority been obtained from the licensee of the station whose programs are to be retransmitted?

[ ] YES [ ] NO

6. Station Identification

Indicate how station identification will be made:

[ ] FSK [ ] Amplitude Modulation of FM Aural Carrier

[ ] by Primary Station [ ] Not Required

(August 1978 edition may still be used.)

FCC Form 346
February 1980

Section I, Page 2

THE APPLICANT hereby waives any claim to the use of any particular frequency or of the ether as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. (See Section 304 of the Communications Act of 1934).

THE APPLICANT represents that this application is not filed for the purpose of impeding, obstructing, or delaying determination on any other application with which it may be in conflict.

THE APPLICANT acknowledges that all the statements made in this application and attached exhibits are considered material representations, and that all the exhibits are a material part hereof and are incorporated herein as if set out in full in the application.

CERTIFICATION

I certify that the statements in this application are true, complete, and correct to the best of my knowledge and belief, and are made in good faith.

Signed and dated this _____ day of _____, 19___.

_____
(Name of Applicant)

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND IMPRISONMENT, U. S. CODE, TITLE 18, SECTION 1001.

By _____
(Signature)

Title _____

FCC NOTICE TO INDIVIDUALS REQUIRED BY THE PRIVACY ACT

The solicitation of personal information requested in this application is authorized by the Communications Act of 1934, as amended.

The principal purpose(s) for which the information will be used is to determine if the benefit requested is consistent with the public interest.

The staff, consisting variously of attorneys, accountants, engineers, and application examiners, will use the information to determine whether the application should be granted, denied, dismissed, or designated for hearing.

If all the information requested is not provided, the application may be returned without action having been taken upon it or its processing may be delayed while a request is made to provide the missing information. Accordingly, every effort should be made to provide all necessary information.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, P.L. 93-579, DECEMBER 31, 1974, 5 U. S. C. 552a(e)(3).

EXHIBITS furnished as required by this form:

Exhibit No.	Para. No. of Form	Name of Officer or Employee (1) by whom or (2) under whose direction exhibit was prepared (show which)	Official Title

Section II

LEGAL QUALIFICATIONS

INSTRUCTIONS: As used in Paragraphs 1 through 9, inclusive, of this Part, the words "principal party to this application" have the following meanings, respectively: In case of *an individual applicant*, the applicant. In case of *a partnership applicant*, all partners, including limited and silent partners. In case of *a corporate applicant*, all officers and directors. In case of *any other applicant*, all executive officers and members of the governing board.

If the applicant is now a licensee of an existing Standard, FM, Television, or International broadcast station, Paragraphs 4 through 8 need not be completed.

1. Applicant is (check one): An individual ☐, a general partnership ☐, a limited partnership ☐, a corporation ☐, an unincorporated association ☐, governmental entity ☐, other (specify) ☐.

2. If applicant is not an individual, give the State, District, Territory or Possession under the laws of which it is organized.

3. a. Complete Table 1 on page 3 of Section II

b. Does applicant or any principal party (officer or director) to this application have now, or has applicant or any such party had, any interest in, or connection with, any standard, FM, television, television translator, or FM translator station? ☐ YES ☐ NO

If the answer is "Yes", show particulars in Exhibit No.

c. Does applicant or any officer or director thereof now have any interest in or connection with a cable television system (CATV)? ☐ YES ☐ NO

If the answer is "Yes", set forth particulars in Exhibit No.

CITIZENSHIP AND OTHER STATUTORY REQUIREMENTS
(See instructions above)

4. If applicant is an individual, is the applicant a citizen of the United States; or, if applicant is not an individual, are all principal parties to this application citizens of the United States? ☐ YES ☐ NO

If the answer is "No", state the name and citizenship of each person who is not a citizen of the United States.

5. a. Is applicant or any principal party (officer or director) to this application a representative of an alien or of a foreign government? ☐ YES ☐ NO

b. If the answer to the foregoing is "Yes", submit as Exhibit No. a full disclosure concerning the persons involved.

6. a. Has applicant or any principal party to this application had a station license revoked by order or decree of any Federal court? ☐ YES ☐ NO

b. Has the applicant or any principal party to this application been found guilty by a Federal court of the violation of the laws of the United States relating to unlawful restraints and monopolies and to combinations, contracts, or agreements in restraint of trade? ☐ YES ☐ NO

c. Has the applicant or any principal party to this application been finally adjudged guilty by a Federal court of unlawfully monopolizing or attempting unlawfully to monopolize radio communications, directly or indirectly, through the control of the manufacture or sale of radio apparatus, through exclusive traffic arrangements, or by any other means, or to have been using unfair methods of competition? (See Section 313 of the Communications Act of 1934) ☐ YES ☐ NO

d. Has the applicant or any principal party to this application been found guilty by any court of any felony, or of the violation of any state, territorial or local law relating to unlawful lotteries, restraints and monopolies and combinations, contracts or agreements in restraint of trade, or of using unfair methods of competition? ☐ YES ☐ NO

e. Is there now pending in any court or administrative body against the applicant or any principal party to this application any action involving any of the matters referred to in Paragraphs 6(a), (b), (c) and (d) above? ☐ YES ☐ NO

f. Have voluntary proceedings in bankruptcy been instituted by, or have involuntary proceedings in bankruptcy ever been brought against applicant or any principal party to this application? ☐ YES ☐ NO

g. Are there outstanding any unsatisfied judgments or decrees against applicant or any principal party to this application? ☐ YES ☐ NO

h. If the answer to any of the foregoing parts of this paragraph is "Yes", submit as Exhibit No. a full disclosure concerning the persons and matters involved, identifying the court and the proceeding (by dates and file numbers), stating the facts upon which the proceeding was based or the nature of the offense committed, and the disposition of the matter.

Section II, Page 2

7. Is applicant corporation, directly or indirectly, controlled by another corporation or legal entity? ☐ YES ☐ NO
If the answer is "Yes", state below the name of such other corporation or legal entity, and state how such control, if any, exists and the extent thereof.

8. Is the corporation or legal entity named in Paragraph 7 in turn a subsidiary? ☐ YES ☐ NO
If the answer is "Yes", submit the information in Table I, Page 3, Section II for each company to and including the organization having final control.

9. Will the applicant have and maintain absolute legal control of the station, its equipment, and operation? If No, explain. ☐ YES ☐ NO

10. Environmental statement, See Part 1, Subpart I of the rules.

Would a Commission grant of your application be a major action as defined by Section 1.1305 of the Commission's rules?

YES ☐ If yes, submit as Exhibit No. the required statement in accordance with Section 1.1311 of the rules.

NO ☐ If no, explain briefly.

FINANCIAL QUALIFICATIONS

11. If contemplated expenditures are more than $500.00, attach as Exhibit No. a detailed showing as to how the cost of construction and operation will be financed.

12. If contemplated expenditures are more than $500.00, give estimated initial costs of making installation for which application is made. The cost shown must be the costs in place and ready for service.

a. Estimated Cost of Construction	b. Estimated Cost of Operation for First Year

13. If contemplated expenditures are more than $500.00, attach as Exhibit No. a detailed balance sheet or financial statement as at the end of a month within 90 days of the date of the application, showing the applicant's assets (including pledges, if any), current and long term liabilities, and net worth.

14. If this application is for a new VHF television, or FM translator, have any funds, legal or engineering services or anything else of value been furnished, directly or indirectly, by the licensee or permittee of any television or FM broadcast station or any person associated with such station? ☐ YES ☐ NO
If the answer is "Yes", attach an explanation as Exhibit No. , identifying the source and nature of the financial support or assistance.

FCC Form 346 (Page 4)
February 1980

Section II, Page 3

TABLE I

If applicant is an individual, complete columns (a) and (b) stating (a) applicant's name and residence (home) address or addresses, and (b) applicant's individual interest. *If applicant is a partnership,* complete columns (a) and (b) stating as to each general or limited partner (including silent partners) (a) name and residence (home) address or addresses, and (b) nature of partnership interest (i.e., general or limited). *If applicant is a corporation or unincorporated association,* complete columns (a) and (b) giving the information requested as to all officers and directors, or other members of the governing board.

NAME AND RESIDENCE (home) ADDRESS(es) *(a)*	OFFICE HELD *(b)*

FCC Form 346 (Page 5)
February 1980

Section III, Page 1

ENGINEERING DATA

1. Facilities requested:

a. Output Channel No. / Frequency: MHz	Transmitter Output Power	Proposed Principal Community or Communities to be served: City: / State: / Estimated total population to be served:	Primary Station (station to be rebroadcast) Call: Channel No. / City: / State: / Frequency: MHz
b. Input Channel No. / Frequency: MHz	If station is to operate via another translator station, indicate call sign and location of final intermediate translator:		

2. Proposed transmitter location:

City	County	State
Address or other description of location	Geographical coordinates of transmitting antenna to nearest second North Latitude ° ' " West Longitude ° ' "	

Attach as Exhibit No. a map or maps (preferably topographic, if obtainable, such as U. S. Geological Survey quadrangles) for the area of the proposed transmitter location and show drawn thereon the following data:

a. Scale of miles.
b. Proposed transmitter location accurately plotted.
c. Principal community to be served by the proposed TV or FM translator station, clearly identified and labeled.
d. Locations of all known radio stations (except amateur), such as AM, FM, TV, Translator, Police, Fire, Aeronautical, Public Utility, etc., and known commercial or government receiving sites, within the immediate vicinity of the proposed transmitter location.

3. Transmitter:

Make	Type No.	Rated output power (watts) P

4. Transmission line:

Make	Type No.	Length	Rated efficiency E for length given (decimal fraction)

5. Transmitting antenna

Make	Type No. 1/	Description 1/	Power gain G (multiplier) in lobe of maximum radiation relative to a half-wave dipole

Orientation 2/	Height above ground 3/	Elevation of Site 4/	Elevation of Community 5/	Effective radiated power R (R = P × E × G)

1. Give basic type using general descriptive terms such as half-wave dipole, "bow-tie" with screen, corner reflector, 10 element Yagi, 4 element in-phase array, two stacked 5 element Yagis, etc.
2. Show the direction of the main radiation lobe in degrees with respect to true north in a 360 degree horizontal azimuth, numbered clockwise, with true north as zero azimuth.
3. Show height to topmost portion of structure, including highest top mounted antenna and beacon if any.
4. Show the ground elevation above mean sea level at the base of the transmitting antenna supporting structure.
5. Show the average elevation of the community above mean sea level, or in lieu thereof, the commonly used elevation figure for the community to be served.

FCC Form 346 (Page 6)
February 1980

Section III, Page 2

6. Attach as Exhibit No. a vertical plan sketch for the proposed total structure(s) including supporting structure(s), giving height of center of radiation above ground, overall height of structure above ground, including lighting beacon (if any) and height above mean sea level in feet for all significant features for BOTH RECEIVING AND TRANSMITTING ANTENNAS. Also indicate any horizontal separation between receiving transmitting antennas.

7. Will the proposed antenna supporting structure be shared with another station or stations of any class? ☐ YES ☐ NO
If the answer is "Yes", list the call signs and class of such stations.

8. If this application is for modification of an existing station, has current information been filed with the primary station as to your call sign, exact location of your station, and the name, address, and telephone number of the person to be contacted in an emergency to suspend operation of the translator? ☐ YES ☐ NO
If "No", explain in Exhibit No.

9. Attach as Exhibit No. a polar diagram of the radiation pattern (relative field) of the transmitting antenna, showing clearly the correct relationship between the major lobe or lobes and the minor lobes of radiation. If a non-directive transmitting antenna will be employed, i.e., an antenna with an approximately circular radiation pattern, check this ☐ and omit the polar diagram.

10. Are there any terrain features between the proposed transmitting site and the community to be served which would interfere with line-of-sight transmission to any part of the principal community? ☐ YES ☐ NO
If the answer is "Yes", attach as Exhibit No. a description of the extent of the area affected.

11. a. List all co-channel and first adjacent channel translator stations existing or authorized within 15 miles of proposed site:

b. If this application is for a UHF TV translator, does the proposed transmitter location meet the mileage separation requirements of Section 74.702 of the Rules? ☐ YES ☐ NO
Attach as Exhibit No. a list of assignments and channel allocations considered.
c. If the answer to 11.b above is "No", attach an explanation as Exhibit No.

12. Has FAA been notified of proposed construction? ☐ YES ☐ NO
If yes, give date and office where notice was filed.
(Not necessary to file FCC Form 714, See Part 17 of the rules.)

13. Unattended operation:

a. Is unattended operation proposed? ☐ YES ☐ NO
If the answer is "Yes", and this application is for authority to construct a new station or to make changes in the facilities of an authorized station which proposes unattended operation for the first time, attach Exhibit No. , containing a full description of the means of compliance with the several requirements of Section 74.734 (TV Translators) or Section 74.1234 (FM Translators) of the Rules concerning unattended operation.

b. In space below state name, address and telephone number of a person or persons who may be contacted in an emergency to suspend operation of the translator should such action be deemed necessary by the Commission:

Name(s)

Address (street or other description)

City & State ZIP Code

Telephone number(s) (include area code)

I certify that I represent the applicant in the capacity indicated below and that I have examined the foregoing statement of technical information and that it is true to the best of my knowledge and belief.

Date _____ Signature _____
(check appropriate box below)

Telephone _____
(include area code)

☐ Technical Director ☐ Chief Operator
☐ Registered Professional Engineer ☐ Other (Specify)
☐ Consulting Engineer

FCC Form 346 (Page 7)
February 1980

PUBLIC NOTICE

FEDERAL COMMUNICATIONS COMMISSION
1919 M STREET N.W.
WASHINGTON, D.C. 20554

News media information 202/254-7674. Recorded listing of releases and texts 202/632-0002.

"CUTOFF PROCEDURES FOR TV TRANSLATOR AND LOW POWER TV APPLICATIONS."

Background: On September 9, 1980, the FCC adopted a Notice of Proposed Rule Making in its inquiry into the future role of low power television broadcasting and TV translators. The Commission is proposing a new TV service, the low power television broadcast service. The service would include existing television translators, devices that obtain distant television signals, amplify them, and rebroadcast them locally on another channel. Comments on these proposals are due by January 15, 1981, and reply comments by March 1, 1981.

During the pendency of the rule making, the Commission decided not to impose a "freeze" on the processing of translator applications. The Commission also instructed the staff to entertain applications, under certain conditions, for translators that include "low power features," notably authority to originate programs. The purpose of this public notice is to explain to prospective applicants the "cut-off procedure" and other procedures being followed by the Broadcast Bureau in the handling of what is expected to be an extraordinary influx of translator and low power applications. 1/

References: Every applicant is urged to become familiar with the materials listed in this paragraph prior to making an application. All future translator grants will be conditioned upon the outcome of the low power rule making. Translator applications and translator applications with requests for low power features all will be processed in the same manner. Therefore, the listed materials will be of interest to the conventional translator applicant, whether or not low power operation is contemplated:

1. Subpart G of Part 74 of the Commission's Rules and Regulations. This subpart contains the existing rules for TV translators. It can be located in Title 47 of the Code of Federal Regulations, or obtained as part of Volume III of the Commission's Rules in loose-leaf format for sale by the Superintendent of Documents, Washington, D.C. 20402.

2. Notice of Proposed Rule Making in BC Docket No. 78-253 (Low Power TV). This document was adopted by the Commission on September 9, 1980, was published as Part V

1/ The Commission has received three petitions seeking modifications in the procedures to be followed during the pending of this rule making. The Commission expects to act on these petitions early in 1981.

of the Federal Register for Friday, October 17, 1980, and appears in the Register on pages 69177 to 69194.

3. "Interim Processing Procedures for TV Translator Applications Seeking Low-Power Features." This document was prepared by the Broadcast Bureau and published as Part VII of the Federal Register for Wednesday, September 17, 1980. It appears in the Register on pages 62003 to 62005.

The remainder of this public notice addresses several questions regarding the processing of applications that have been posed to the Broadcast Bureau since the Commission's action of September 9.

1. Q: Can I file now for a new conventional TV translator station?

   A: Yes. The filing would be done on the FCC Form No. 346. The effect of the low power rule making will be that, if your application is granted, it will be conditioned upon the outcome of that rule making. The condition will state that your license or permit can be modified or revoked upon 60 days notice after the release of a report and order in the low power proceeding.

2. Q: Can I file now for a low power TV station?

   A: Yes, using the same Form No. 346, but only if certain requirements are met. Any authority that is not permitted under the existing translator rules, but that would be allowed under the proposed low power rules, cannot be granted unless there is a specific request to waive the rules in question. That is why applicants need to familiarize themselves with the translator rules and with the proposed low power rules. In addition, any request for waiver can be acted upon only if it is supported by a public interest justification, a narrative statement of exactly how the waiver request could deliver benefits to the public in the community proposed to be served. As with conventional translator applicants, all grants would be conditioned upon the outcome in the rulemaking.

3. Q: What about subscription television (STV)? Is that permitted for conventional translators or would I need some kind of a waiver?

   A: Subscription TV involves the encoding, or scrambling, of a broadcast signal so that it can only be received by viewers who lease a decoder from the broadcaster. It is only authorized to the holder of a separate STV authorization. Under existing rules, you can use a translator to rebroadcast programs that were scrambled at the primary station but only if you also are the owner of the primary, so that the primary's STV authorization covers your subscription service on the translator as well. If the translator is separately owned, then you

would not have authority to broadcast a subscription service, and so would need to seek a waiver if you were planning to use the scrambled programs of the primary station. If you want to take an unscrambled signal and scramble it for rebroadcast at a low power station, you would need a waiver of the translator rule that forbids alteration of the off-air signal so as to make it inaccessible to conventional TV receivers. You also would need the consent of the primary station for that type of rebroadcast. If it's not rebroadcast, but origination at the low power station, you can apply for STV also, if you request the appropriate waivers.

4. Q: What's involved in making a translator or a low power application?

   A: The Form No. 346 has its own instructions, and these must be followed completely and accurately. Any departure from the requirements in the Rules or in the form itself must be explained and justified in a separate exhibit. For example, on page 6, the form calls for the "Primary Station (station to be rebroadcast)." If authority to originate programs is sought, rather than rebroadcast, this can be answered, "None - See Exhibit No. ___." Your exhibit would contain a request for waiver of the rules limiting the service to rebroadcast, and a public interest justification in support of the waiver, explaining fully what you have in mind.

5. Q: How would I go about selecting a channel?

   A: Channel selection should generally be performed by a qualified technical expert. Indeed, it is likely that an expert will be necessary to prepare the engineering data required by the form. The Commission's staff is not available to consult with applicants on channel availability so you need to obtain expert advice, if you are not yourself an expert.

6. Q: From the "TV Factbook" it looks to me like I can use Channel 17 here in Big City.

   A: That illustrates the hazards of not securing a professional engineering analysis. In 13 large markets, Channels 14-20 are extensively used for both Common Carrier and Private Radio service. Channel 17 may not be available, for example, near the Gulf of Mexico.

7. Q: Are there special problems near the Canadian and Mexican borders?

   A: Conventional translator applications, under existing rules, can be made near the borders. An application to operate a one kilowatt UHF station at a location not in the Table of Assignments within 250 miles of the Canadian border, as proposed, but not adopted in the low power proceeding, cannot be acted upon because coordination with Canada has

not yet even begun. Such an application would be returned to the filer. There also is an impediment in existing bilaterial agreements to a one kilowatt UHF off the Table of Assignments within 200 miles of the Mexican border. Such an application also would be returned, during the interim.

8. Q: If I want a UHF channel and none is available under current spacings, can I use the "supplemental showing" engineering approach that was described in the low power Notice?

A: Yes, but only on a waiver basis, with a properly supported request to waive the required minimum separations to full service stations. All applicants must try to meet the current separations, as given in Section 74.702(c) of the Rules. You can ignore vacant station allotments in the Television Table of Assignments.

You also can show that a channel cannot be used because of likely interference to another translator station. The following test will apply: The existing translator must be located within 30 miles of your facility and must operate on the same channel, an adjacent channel or the seventh, fourteenth or fifteenth channel above or below the channel under consideration. If a suitable channel cannot be found, the Commission will entertain a supplemental engineering showing.

The failure to show that the conventional approach will not work will result in an application being returned summarily without action. The supplemental engineering alternative permits you to use "desired-to-undesired" (D/U) signal strength ratios as determined in the UHF TV receiver interference susceptibility study of 1974. 2/ You must determine the height above average terrain in the direction of each short-spaced TV station. If more than eight stations are involved, you can determine the height above average terrain in eight directions at equally spaced intervals of 45 degrees. If an omni-directional transmitting antenna is to be used, you must compute the level of undesired F(50,10) signal strength from your station at the point where the line between the desired station and your station intersects

---

2/ See paras. 55-57 of the notice of proposed rulemaking, where it discusses the study: W. K. Roberts and L. C. Middlekamp, "A study of the characteristics of Typical Receivers Relative to the UHF Taboos," NTIS PB-235-957 (June 1974).

the actual Grade B Contour (64 dBu contour) of the desired station. This level must not exceed the values specified in the Notice. If a directional antenna is to be used, field strength calculations must be made at five points along the desired station's Grade B Contour. These points represent the intersection of lines drawn at the following angles with reference to the line between the two stations: -30, -15, 0, +15, +30 (degrees). The horizontal radiation pattern of the antenna should determine the effective radiated power transmitted in each direction. If you propose to operate on frequency offsets of + 10,000 +_1,000 Hz, you can satisfy a co-channel D/U ratio of 28 dB. Field strength calculations must be based upon the F(50, 10) curve contained in Section 73.699 of the Commission's Rules (Figure 10c).

Any application with a supplemental engineering showing that does not conform to these criteria will not be accepted for filing but will be returned. The Commission's technical staff is unable to assist you in the interference analysis. Its sole function is to review the technical showings that are submitted. In any event, the frequency selection described here is not a substitute for the overriding premise that interference must not be caused to the reception of full service stations. These criteria are minimal ones, and applicants would be free to demonstrate even greater protection to full service stations.

9. Q: What criteria should I use to calculate the benefits of terrain shielding?

A: Terrain can give you substantial interference protection. Unfortunately, the Broadcast Bureau has concluded that it is beyond the resources available to analyze terrain protection calculations on an individual basis, at least until final rules are in place. Therefore, terrain can only be used where the interference protection it provides is shown to be "obvious," as is the practice under existing translator rules. Generally, you will not be able to rely upon calculations of terrain protection, and applications that turn on this issue will be returned during the interim.

10. Q: How do I select a site?

A: In many cases, site selection will be the most difficult part of preparing an application. It involves finding a place where desired coverage is good and objectionable interference is not expected, among other engineering issues. It also involves the legal question of whether or not you actually have obtained a right of access to the proposed site, and possibly whether or not it involves a "major" environmental action. Again, the Commission's staff cannot select sites. That is up to you.

11. Q: Are there any other latent defects or pitfalls I need to know about that are not revealed by information required in the Form 346?

A: The complete answer to that is that there is no substitute for familiarizing yourself with the translator rules. To give one example, the rules require some type of local publication of a notice that you have filed an application. This is not required to be reported in the Form No. 346, but if you omit the step, it could result in your application being returned.

12. Q: What happens to an application once it is filed?

A: There are three stages:

Tender, cut-off, and grant (or denial).

13. Q: Go ahead, start with tender.

A: When an application is submitted, it goes to the Broadcast License Division of the Broadcast Bureau. There, a preliminary review is made to see whether it meets basic threshhold criteria for acquiring a file number. These are:

-Was the engineering data properly signed and dated?

-Was the overall application properly signed and dated?

-Does the frequency requested appear to be available for application?

-Is the proposed equipment type approved, and does the number for the equipment correspond exactly to a number on the License Division list of type approved equipment?

-Are all of the lines and blocks filled in--that is, does the application appear to be complete?

An application not meeting one of these criteria is returned without action. An application meeting all of the criteria is given a file number, and is turned over the the Auxiliary Services Branch of the Broadcast Facilities Division for further action. No separate list of translator applications tendered is published by the Commission. There used to be a list of "accepted" applications published about the same time as the "cut-off" but that step now is abolished and merged with the cut-off procedures.

14. Q: Before we get to "cut-off," how would I find out that an application was on file?

A: At any given moment, you can't know all of the applications that might be on file. Applications are submitted to the FCC Secretary, and it may take a couple of days for them to arrive in Broadcast License. Others may be in the mail. But once an application is received by the License Division, a copy is placed in a public reading room in Room No. 239 at the Commission's main building in Washington, D.C.

15. Q: And the "cut-off" procedure?

A: Once an application arrives in the Auxiliary Services Branch, it receives preliminary legal and engineering review. Upon review, if the application appears to be complete and sufficient, it is placed on a "cut-off list." The law requires a period of at least 30 days during which an application is out on public notice. That period is available for other parties to submit an informal objection, a petition to deny, or an application that is mutually exclusive, that is, one that could not be granted if the application on the public list is granted first. The date specified as the close of the period for all of these submissions is referred to as the "cut-off date," hence the name, cut-off list. The Commission need not and almost invariably will not consider pleadings or additional applications if they are submitted after the cut-off date for an application on the list. Cut-off lists are published in the Federal Register.

The Bureau's interim processing guidelines, cited earlier, said clearly that "Defective applications will be summarily returned without action." The review process continues even as the cut-off period runs, and a clear defect in basic qualification criteria will result in an application being returned up to or even after its cut-off date. In other words, the publication of an application on the cut-off list is not a statement that the Broadcast Bureau regards it as grantable. In fairness to other parties, it is essential during the interim that only complete and sufficient applications be permitted to reserve a place in line. The practice of "coaching" applicants and permitting liberal amendments will not be followed in this service during the interim.

16. Q: How does the low power proceeding change the cut-off procedure?

A: When the Commission adopted the low power notice on September 9, 1980, it instructed the staff not to place any "low power" applications, involving waivers, on a cut-off list prior to at least 30 days after the release of the text of its Notice of Proposed Rule Making. The text was published in the Federal Register on October 17, 1980. In all other respects, the cut-off procedures will remain the same as the

procedures that were observed in the past. The staff will continue to prepare and to publish cut-off lists for translator and low power applications together from time to time throughout the pendency of the rule making. No cut-off date will be earlier than the date on the first list, and future cut-off periods also will be for 30 days.

17. Q: So, if someone files where I was thinking of filing, I need to file on top of them during the cut-off period, or I will be forever barred, is that right?

A: No. Not necessarily. That would be true only if the application is for the last technically feasible frequency in that locality. If not, you can apply in the same locality on another channel some time in the future. In addition, an application passing through its cut-off date may not be grantable, so there is a chance that the frequency would come open again. (See Question 15). Finally, the Commission has said that permittees would be expected to construct promptly, and in no event beyond a year from the first authorization. For the interim, the Broadcast Bureau intends to cancel permits routinely after a year if a station has not been readied for operation. The only exception would be for a permittee proving that it made a prompt, firm equipment order, and could not secure delivery through no fault of its own.

18. Q: What happens if more than one application is filed for the same channel in the same place?

A: Because the procedures and the criteria for sorting out conflicts like that are both subjects of the rule making, no mutually exclusive case can be resolved during the pendency of the rule making. This is true of conventional translators and low power applications, alike. The staff would have to defer action on that mutually exclusive pair or group, until final rules were adopted.

19. Q: The last step was the grant?

A: Grant or denial. A complete, sufficient and uncontested translator application would be granted routinely by the staff upon delegated authority. Applications with petitions to deny filed against them could be granted or denied by the staff, where it has delegated authority for this, or taken to the Commission for the final decision. A clean uncontested low power application that clearly falls within existing low power precedents, such as those in Alaska, also could be granted by the staff upon delegated authority.

Low power applications with novel features, outside of existing precedents, will be taken to the Commission for a decision. For example, the Notice of Proposed Rule Making stated that the Commission reserved the right to defer action where filings were being made

merely to store a large quantity of TV broadcast frequencies (Para. 80). The staff will refer to the Commission for its decision any group of applications where that language appears to be applicable.

20. Q: I know the limit is one kW of translator power at UHF, even under the proposed rules. Could I seek a further waiver, say to operate at 2.5 kW?

A: The Commission's instructions were for the staff to defer action on any applications seeking waiver that are inconsistent with the proposed technical standards or the proposed ownership rules for the low power television service. Thus, no such application could go out on a cut-off list. However, you can present the case for different standards by participating in the rule making and filing comments.

21. Q: In that case, I should submit now at one kilowatt. At least then I could be home free with an authorization during the interim.

A: Using your example, if 2.5 kW really was what you needed to provide adequate service, your better bet could be to await the result of the rule making and to participate in it. The proposed service is a secondary service, and that makes it very different from conventional broadcast. Stations will come, and stations will go. The only grants available are secondary grants, and no one should apply for one--especially in the interim--thinking that it is risk free. It is not. It is risky. One of the risks is the risk of being bumped by a primary station--a risk inherent in the service as proposed. Future full service stations would be protected against interference from an existing low power station even if the two stations are not in the same market. Or, you can submit an application with a perfect engineering statement, obtain a construction permit, build, and then find out in practice that you create objectionable interference for some reason. If the interference cannot be corrected, you must change channels or go dark.

An even greater risk is construction under an interim authorization, subject as it is to new conditions, and perhaps a new cut-off period, if the allocation or ownership proposals are changed when rules are adopted by the Commission. As mentioned, all interim grants are subject to a rewrite, or even a revocation, when the rule making is over (See Questions 1 and 2). Finally, given the fact that the Commission now is soliciting comments on the entire low power concept, it is even conceivable that the Commission might ultimately conclude that the public interest would not be served by the final authorization of the low power service.

22. Q: During the interim, could I apply for a conventional translator, get through the cut off and then upgrade later to offer origination, STV, or both?

A: The Commission proposes to add "low power" features to all existing translators through a minor modification of the license, which would make that authority more or less automatic. Major modifications, by contrast, would entail new notice and comment periods, a new cut-off date, and the possibility of competing applications. That is only a proposal, however. During the interim, if you apply for a conventional translator, you would need to reapply later during the interim for any authority beyond the existing translator rules and then, if your application is accepted, it would go on a new cut-off list.

The Commission has not yet decided whether the upgrading of an interim translator grant, after the adoption of final rules, would be treated as a minor change, or a major one involving a new cut-off period. Since the September 9 notice, commenting parties can assume that all applications inherently are low power in their potential, and that grants made by this route may ripen through rule making into low power authorizations. On the other hand, the Commission may decide--in light of whatever rules it adopts--that fairness to all concerned requires a new cut-off period for some or all interim grants, before they can function in any manner other than the one for which they sought authority--whether translator or low power.

23. Q: Is there any premium on being the first to file?

A: No. The premium is on filing a complete and accurate application. There can be instances where the last frequency in a locality is closed as a complete and sufficient application for it passes the cut-off date specified for that group in the Federal Register. But apart from that, there is no urgency. The Commission has proposed a preference for a first filing. But, if that preference is ever finally adopted, it will only take effect where every application in a mutually-exclusive group was filed at least 30 days after the release of a final report and order. That event is unlikely to occur any sooner than next summer.

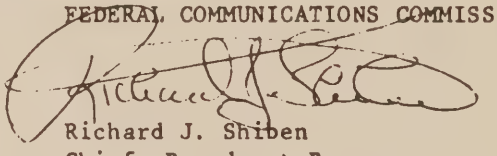
24. Q: If I apply for a bunch of these stations, will my descendants bless my name as they cruise about their country estates in a solar powered limousine?

A: You are making a lot of assumptions there. Our best engineering analysis completely confirms the accuracy of Commissioner Lee in his separate statement to the low power notice:

Finally, I am concerned that potential applicants for low power stations have not been alerted adequately to the prospect that such stations may exhibit very limited service areas due to interference from regular stations. While this isn't a reason to deny anyone use of one of these channels, I don't want anyone to misunderstand what this low power proposal really means. It certainly isn't going to be a license to print money.

The bottom line on this interim procedure is that you should only apply, first, if you are willing to accept a grant that is conditioned upon the outcome of the rule making, and second, if you have a solid plan and are presently willing and able to construct a station. There are no guarantees that the station would be viable, or that it could stay put where it was authorized. Those are practical considerations for you to ponder carefully.

FEDERAL COMMUNICATIONS COMMISSION



Richard J. Shiben
Chief, Broadcast Bureau

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Part 73

[BC Docket No. 78-253; RM-1932; FCC 80-503]

Inquiry Into the Future Role of Low-Power Television Broadcasting and Television Translators in the National Telecommunications System

AGENCY: Federal Communications Commission.

ACTION: Notice of proposed rule making.

SUMMARY: The Federal Communications Commission proposes the creation of a new low power television broadcast service, in which stations would be authorized to originate programs to an unlimited extent and to conduct their own subscription television operations. The proposed service would include television broadcast translators, which currently are regulated under Part 74, Subpart G of the Commission's Rules. The proposed rules are based upon a Commission staff study, to be released at a later date: *Report and Recommendations in the Low Power Television Inquiry (BC Docket No. 78-253).* The action is based, in part, upon evidence of a large unsatisfied demand for television broadcast service, in both rural and urban areas.

DATES: Comments must be received on or before January 15, 1981, and reply comments on or before March 1, 1981.

ADDRESSES: Federal Communications Commission, Washington, D.C. 20554.

FOR FURTHER INFORMATION CONTACT: Michael Couzens, Broadcast Bureau, (202) 632-6302.

SUPPLEMENTARY INFORMATION: No freeze on translator applications is proposed for the pendency of the rule making. The Broadcast Bureau published "Interim Processing Procedures for TV Translator Applications Seeking Low Power Features," on pages 62003-62005 of the **Federal Register** of September 17, 1980.

In the matter of an inquiry into the future role of low-power television broadcasting and television translators in the National Telecommunications System, BC Docket No. 78-253, RM-1932.

Adopted: September 9, 1980.

Released: October 17, 1980.

By the Commission: Chairman Ferris issuing a separate statement; Commissioner Lee concurring and issuing a statement; Commissioner Quello concurring in the result; Commissioner Washburn concurring in part and issuing a statement; Commissioner Fogarty concurring in part and issuing a separate statement.

I. Introduction

1. The Commission today concludes the inquiry stage of its study into the role of low power television broadcasting, including television translators,[1] and proposes rules for a new low power television service. These rules would be contained in a new "Subpart G—Low Power Television Broadcast Stations," in Part 74 of the Commission's rules. The current Subpart G contains the rules for television broadcast translators. Many of the features of the present Subpart G would be retained in this proposed revision, but the results of the inquiry have convinced us that we should explore a number of new approaches. Through the rule changes proposed we hope to bring television service to locations that otherwise are unserved or underserved—for whatever reasons—by regular, full service[2] television stations and by cable services. We propose to build upon the existing translator service, affording new opportunities in low power television. At the same time, translator licensees will be free to continue the service they have offered in the past, if that is their choice.

2. This proceeding began with the adoption of a *Notice of Inquiry* on August 8, 1978, 68 FCC 2d 1525 (1978, hereinafter, *"Notice").* This *Notice* made it clear that this proceeding was addressed to the entire concept of low power television broadcasting. We stressed the possibility that the current translator service could be viewed as the evolutionary basis for a larger and more flexible low power service. We observed that translator policy generally had developed on an *ad hoc* basis, and announced our purpose to be the development of a comprehensive, long-range plan. The record developed in this proceeding has fulfilled this hope, and enables us today to propose a new low power television broadcast service.

3. The decision to propose the inauguration of a new low power television service is motivated, in part, by our recognition of a large unsatisfied demand for television service. In rural areas, millions of American citizens do not receive even a basic complement of three or four television signals. In major urban areas, there are few available channels, and when one does become available, competing applications are filed. In addition, there is considerable interest in the use of other, newer television delivery systems into the home, such as multipoint distribution service (MDS), pay cable, "superstations," and videocassettes and video discs. Market studies and economic research continue to suggest that consumer demand for television programming exceeds the supply in many areas of the country. The technology now is available for low power originating stations as well as for their interconnection. With the changes we propose, we believe that low power television can play an important part in responding to these needs. Before discussing our specific proposals, we shall briefly describe the results of the inquiry stage of this proceeding. Viewed in this context, our proposals can be seen as a natural evolutionary step.

II. Results of the Inquiry

4. Shortly after the *Notice* in this proceeding was adopted, a Commission-wide task force was created to develop the public record, to sponsor research, and to perform its own studies. This group, the Low Power Television Inquiry Staff, has submitted the results of its work to the Commission as the *Report and Recommendations in the Low Power Television Inquiry* (hereinafter, *"Report").* The *Report* provides a full record that enables us to proceed to the stage of proposed rules. Because of the *Report,* we can expect that commenting parties will engage in a discussion that is clearly focused, detailed, and therefore of maximum use to the Commission in any final decision on adopting rules for this promising new service.[3] Although the *Report* is not being adopted as a position of the Commission, we have relied upon it in the preparation of this *Notice,* and would expect commenting parties to take its findings into account.

5. During the inquiry, comments and reply comments were received from more than 80 individuals and groups representing a wide range of interests. The staff summarized this record in *Attachments A* and *B* to its *Report.* The

[1] A television translator is a low power broadcast station that receives a television signal on one channel, amplifies it and transmits it on another channel. Although we expect tanslators to continue to play a part in bringing television reception, we propose to broaden the concept of low power television to include stations that originate programming and even conduct their own subscription television operations.

[2] We use the term "full service" throughout to describe television broadcast stations with complete facilities and staff. These full service stations are licensed under Part 73 of our rules.

[3] In the *Notice* we anticipated a series of inquiry and, perhaps later, rule making notices. However, we now believe that the staff's *Report* is adequate for us to sharpen the discussion at this point, and that no useful purpose would be served by adding cycles of pleading to what already is an unusually full record for the onset of rule making.

staff also commissioned a survey of very low power originations in the United States and Canada: Parry D. Teasdale, "A Micro-TV Service in the United States," *Attachment C* to the *Report* (hereinafter, "Teasdale"). In addition to its usefulness in revealing the practicalities of very low power station operations, Mr. Teasdale's report appends a significant technical study performed for the Government of Canda, where low power station operations appear to have developed to a considerable degree, Switzer Engineering Services, Ltd., "A Study of Very Low Power TV and FM Transmitters for Remote Communities," (April, 1978, hereinafter, "Switzer"). Finally, the staff performed its own studies and analyses, covering technical, economic, and legal terms.

6. The staff began its analysis with two principal goals, with which we are in agreement. The first goal was to recognize the contribution that the traditional translator operator has given in the past, and so not to recommend rules that would make translator service more difficult to provide, especially in isolated rural areas where the need for television service is greatest. The second goal was to provide maximum flexibility for new originating services to come into being, easily and at low cost. The staff recommended that a new low power television service be created by adding to well-proved translator rules and practices, rather than by attempting to create a separate service "from the ground up." Most significantly, the staff recommended the retention of secondary status for translators and for low power stations. All such stations were envisioned as operating on a noninterfering basis, and as being required to relinquish their frequency if a full service station wished to commence operations using the same channel.

7. The staff reasoned that a new secondary service could be designed for maximum flexibility—in the nature of its program service, in the technical standards, and in licensing procedures. In this way, they argued, the Commission could modify or eliminate many requirements that we would continue to apply to full service station operations. Specifically, no low power station would be required to originate programs to any extent, but all could originate to an unlimited extent. The Commission also would place no artificial restrictions upon the station's method of financial support, whether local taxes, advertisers, or subscription television (STV). Secondary status also was concluded to imply more relaxed technical standards, and a set of liberalized rules regarding ownership.

8. The Commission is well aware of the interest in, and demand for, new television outlets, both in rural and urban areas.[4] We agree with our staff that secondary status for low power stations appears to provide the key to rapid implementation of such service, and so we are proposing rules that follow the broad contours of the staff's recommendations. Before we describe our own proposals, a brief historical sketch is appropriate.[5]

III. History of Television Translators

9. The Table of Television Assignments (hereinafter, "Table") adopted in 1952 was designed to provide service to as large a part of the population as was possible and at the same time to provide local outlets for as many communities as possible.[6] Although the goals of the Table have been largely achieved, service has not been available to all who wanted it. Indeed, from the very beginning, interest in television was so great that conventional means of obtaining reception proved to be inadequate to satisfy the demand. One way of dealing with this problem was the installation of a "community antenna" that would then be connected by cable to households paying a subscription fee for the signals delivered, thus giving birth to the cable industry, originally called CATV for Community Antenna Television. A less expensive approach also was possible involving the reception and amplified retransmission of the weak television signal over a low power installation. This could be either an on-channel booster or a translator that broadcast on another channel. In the early days of television, the Commission's rules made no provision for either kind of operation. This lack of a licensing procedure, however, did not prevent the establishment of such stations. In many areas plagued by poor reception, individuals provided low power service on an extra-legal basis.[7]

10. The first such low power operation probably was established in 1948 and was used to serve homes beyond the reach of a cable TV system. Soon after that, other bossters and translators were established to extend television coverage. When complaints were filed, the Commission sent out field inspectors to shut down these unauthorized operations. By 1958, there were "the estimated number of 1,000 or so," of these unlicensed stations in operation.[8] As they grew in number, the Commission became increasingly concerned about the potential for causing interference to other broadcast services. Without a licensing procedure, the Commission had no way of incorporating them into the overall pattern of assignments.

11. It was against this background that the Commission initiated several proceedings involving the use of translator and booster systems and a possible regulatory scheme for their authorization. In the first of these proceedings, a notice of proposed rulemaking (Docket No. 11331, FCC 55–404) adopted on March 31, 1955, solicited information on the feasibility of licensing VHF and UHF television boosters. While his rulemaking was pending, the Commission adopted a second notice of proposed rulemaking (Docket No. 11611, FCC 56–44), in January of 1956, exploring a regulatory framework within which TV translator stations could be authorized and licensed.

12. The second proceeding was acted on first, and the Commission adopted a report and order which amended the rules to authorize UHF translators. They were limited to the upper 14 UHF channels (that is, Channels 70–83) and their power was limited to 10 watts. The Commission limited translators to the upper 14 UHF channels because they were less congested and would allow more flexibility to meet required protective spacing. The Commissin also believed that confining translators to the less congested upper 14 UHF channels made it possible to relax operating and licensing requirements, and, thereby, to facilitate the viability of translators.

13. While it is true that operation on these channels had the least potential for causing harmful interference to regular television reception, it also is true that these were the least advantageous channels from the translator station's point of view. Not only were there greater costs of

[4] On April 24, 1980, we adopted an *Order* stating that no new applications for broadcast experimental stations proposing use of low power or television translator technology would be accepted for filing, *see* Public Notice, FCC 80–262, April 29, 1980. This was done, in part, because the staff had received so many expressions of interest that new experimental applications could not been handled or evaluated, within our administrative resources. On demand for new outlets more generally, *see Part III* of the *Report*.

[5] A fuller history of TV translators appears as *Part II* of the *Report*.

[6] This table appears in § 73.606(b) of the rules, *see Sixth Report and Order* in Docket No. 8736, 41 FCC 148 (1952).

[7] Kenneth A. Cox, "The Problems of Television Service for Smaller Communities," Staff Report for the Committee on Interstate and Foreign Commerce, United States Senate (85th Cong., 2d. Sess.), December 26, 1958, pp. 11–17.

[8] *Id.*, p. 16.

construction and operation, but also there was a lack of developmental experience. The Commission also rejected the suggestion for an increase in the maximum power output of translators above the 10 watts originally proposed, preferring first to gain experience from operation at the lower power.

14. At this time, the Commission was considering authorizing translators in the VHF band, but it rejected this idea, believing that it would produce interference problems. Throughout this period, the Commission assigned absolute weight to the prevention of any possibility of interference, even if this meant that it could not authorize a means of providing reception to those lacking it.

15. The Commission action restricting translators to the use of the upper 14 UHF channels did not solve the problems posed by unauthorized operations. Many translators and booster systems that had operated previously in the VHF band simply continued to do so. The first challenge to the Commission's efforts to curb these illegal operations came in a case involving C. J. Community Services, Inc. (hereinafter, "C.J."). The Commission issued a cease and desist order to C.J. to halt the operation of its television booster station. On appeal, the United States Court of Appeals for the District of Columbia Circuit reversed the Commission's Order.[9] Although the Court upheld the jurisdiction of the Commission over such operations and held that the unlicensed operation of repeaters was unlawful, it found the Commission remiss in not providing rules and procedures under which the illegal boosters could have been licensed. The Court also pointed to the pending rulemaking in Docket No. 11331, regarding the feasibility of licensing VHF boosters, as an aid in the resolution of the issues that were before the Court.

16. On June 27, 1957, the Commission issued a memorandum opinion and order (FCC 56–700) rejecting the licensing of VHF booster systems, finding what it believed were insurmountable difficulties connected with their operation. Several parties petitioned for reconsideration, requesting an opportunity to provide detailed engineering data that would prove VHF boosters to be feasible. This led the Commission to issue a new notice of proposed rulemaking (Docket No. 12116, FCC 57–829), again examining the possibility of licensing VHF boosters. Ultimately, the Commission again rejected the idea, although in the meantime it had authorized the use of UHF boosters.

17. With the authorization of translator stations and then the pending rulemaking proceeding looking toward the feasibility of licensing booster systems, the Commission determined that there was a need to examine these program distribution services, as well as cable and "satellite" systems.[10] Accordingly, a notice of inquiry was adopted on January 3, 1958, in Docket No. 12443 (FCC 58–493). Among the questions raised were: (1) What economic impact did translators, boosters, satellites and cable systems have on local television broadcast systems? and, (2) What percentage of homes received their only satisfactory television service from stations located in or near communities in which translator, booster, or cable systems were operating?

18. Finally, on July 27, 1960, the Commission issued a report and order authorizing the licensing of VHF translators and modifying the rules applying to UHF translators, 18 RR 1573. These actions are the foundation of the present translator rules. Unlike UHF translators, which could use 100 watts, VHF translators were limited to 1 watt. Because of an amendment to the Communications Act, the Commission was able to license the previously illegal operations and to permit unattended operation of translators.[11] In addition to the question of what to allow, the Commission dealt with who could have it and where it could be built. For example, television licensees were not permitted to obtain a license for a VHF translator that was designed to provide reception beyond the predicted Grade B contour of the primary station, or within its Grade A or B contour where the transitor was intended to provide reception to all or part of any community located within the Grades A contour of any other television station, if the translator would duplicate the other station's programs.

19. By the early 1960's, the general standards for translators had been developed. Although some rule changes were adopted in later years, most actions were taken in connection with applications proposing particular forms of service. Various proposals were put forward that did not meet the requirements of the rules. While the rules were not changed, on a number of occasions waivers were granted to permit operations thought to be in the public interest. Viewed in retrospect, it can be seen that these actions suggested a need for a rule changes so that waiver would not be necessary to respond to the public demand for additional television service.[12]

20. The Table standing alone could not bring adequate service to rural areas. Some areas lacked an assigned channel, while in others the channel was not put to use. This situation led the Commission to take various actions designed to encourage new service. One such approach involved support for UHF development.[13] Other measures included easing the cost of entry into television broadcasting, by permitting a television "satellite" station.[14] These measures by themselves, however, have proved inadequate to satisfy rural demand for television service.[15] In fact, the most significant progress has been made through the enterprise and ingenuity of the rural residents themselves, and later of investors and entrepreneurs, in developing two new delivery systems: television translators and CATV. These systems have grown and have become major parts of our national television service, in urban as well as rural areas.

21. As mentioned, our translator policy has evolved essentially on an *ad hoc* basis. This *Notice of Proposed Rule Making* is designed to address the technical and practical issues in broadly allowing originations on translators. To date, originations have been limited to emergency warnings and to 30 seconds per hour for fundraising. We now believe, based upon the record amassed in this proceeding, that low power stations, using translator technology, hold significant promise as a new source of network, regional and local programs, complementary to the concept of full service television development in the

[9] *C. J. Community Services* v. *F.C.C.*, 100 U.S. App. D.C. 379, 15 R.R. 2029 (1957).

[10] A "satellite" station is a full service station that rebroadcasts entirely the program schedule of another station. There also are "semisatellites" that do have local studios where a limited amount of local programming originates.

[11] Congress had stepped in to solve the problem of the construction of these stations without prior Commission authorization, waiving the ban on premature construction for those built before Congress acted. It also permitted unattended operation of stations that merely rebroadcast another station, Pub. L. 86–609, approved on July 7, 1960.

[12] The most recent of these waivers was the latest of more than 70 waivers granted for the State of Alaska, *see* Wrangell Radio Group, *et al.*, FCC 79–868, released on January 17, 1980. Other examples are collected in *Part II* of the *Report*. The innovative use of lower power technology in Alaska is described by Teasdale, pp. 11–16.

[13] Congressional action also was involved through passage of the All Channel Receiver Act. See paragraph (s) of Section 303 of the Communications Act, Pub. L. 87–529, approved on July 10, 1962, 76 Stat. 151.

[14] For a definition of satellite station, *see* note 10, *supra*.

[15] The gaps in service in rural areas are treated in *Part III* of the *Report*.

Table but also offering their own unique benefits.

IV. Proposed Policy Changes

Introduction

22. Translators simultaneously broadcast the programs of a full service station. Our proposed low power television broadcast service would retain that role in full, but as only one type of service permitted on the low power television station. Any low power television station, including those employing translator technology, would be permitted to originate to an unlimited extent, provided that certain requirements are met.[16] As mentioned, our approach begins with the fundamental principle urged by our staff that low power television broadcast stations, like television translators, should enjoy only a secondary status. This means that a translator or low power station creating harmful interference to a full service station must cease operation if it is unable to change its channel or take other steps to correct the interference. Translators and low power stations also are secondary in the sense that they must give way to a full service station proposing a mutually exclusive use of a frequency. Secondary status permits a more flexible approach that enables the low power television broadcasters to select the appropriate mix of technology that accords with local needs, up to the definitional limit of the service itself: namely, maximum transmitter output powers of 100 watts (VHF) or of 1,000 watts (UHF). The operator willing to assume the risks of secondary status would be given wide latitude to design and engineer a system adapted to local needs. We begin with the standards for programming, financial support, and ownership that we propose to apply to the low power service.

B. Program Services, Financial Support, and Ownership

23. *Low Power Station Programming.* Years ago, the Commission dealt with the question of program originations on translators, observing that:

> The technical hurdles appear insuperable at this time, and for this reason alone, we do not find warrant for initiating rulemaking now looking toward permitting programming originations by translators. We have arrived at this judgment with some regret, because there is much appeal in the exploitation of possibilities for giving smaller communities * * * a means of local self-expression, and of presenting issues of local importance.[17]

At that time the only obstacles were said to be technical. Recent technological and economic developments dictate a re-evaluation of the role of low power technology in the national telecommunications system. It now is clear that low power origination is technically feasible, and a considerable body of experience has been gained from low power originations in practice.[18] We have recognized the importance of this experience, notably in our efforts, through waivers, to support the creative use of this technology in the statewide mini-TV system in Alaska, "a system that provides the only practical means of extending off-the-air broadcast services to the numerous small remote Alaska communities."[19]

24. A number of technical developments have converged to make originations possible. One of these is the development and rapid refinement during the 1970's of low cost portable videotape players, such as the ones that have been used successfully to distribute programs to the originating mini-TV stations in Alaska. Another development, well described by a commenting party at the inquiry stage of this proceeding, is:

> * * * the advent of integrated circuits which can generate full NTSC black-and-white and color synchronization signals (instead of non-interlaced sync as used in low-cost television cameras of the past), as well as generating television carriers and graphics and lettering on the screen of a standard receiver, sometimes along with NTSC color and 4.5 MHz sound. Such integrated circuits greatly decrease the size and cost of high quality (and, for that matter, low-quality) television equipment, requiring less adjustment and being less likely to generate an out-of-tolerance condition, allowing users to concentrate more on subject matter and less on technical details.[20]

As a result, we now know that equipment for originations can be made to function reliably, without creating new problems of objectionable interference.[21] Both live and pre-recorded programs are technically feasible.

25. Finally, in the past five years, satellite technology has opened entirely new possibilities for reliable, low-cost program interconnection services.[22] The use of satellite interconnection for low power TV program services is being demonstrated by Spanish International Network, which is using satellite relays for delivery of its network feed from San Antonio to experimental translator stations that we have authorized in Denver (KA 2XE8) and in Washington, D.C. (KA2XEH).

26. Recently, we revised our translator rules to permit the use of modern FM microwave feeds to deliver program services to a translator from any suitable source.[23] The only remaining limitation upon originations—whether live, on tape, by terrestrial feed or by satellite—has been the restriction imposed by our rules limiting origination to emergency warning and to 30-second fund-raising appeals. The *Report* and record in this proceeding now persuade us that our permissive policies of allowing waivers and experiments were the prefigurement of a much broader potential for delivery of new service to the public. We therefore propose to authorize unlimited originations as an inherent feature of the proposed low power television service. We proceed to a discussion of the practicalities involved that need to be addressed in rulemaking.

27. Copyright liability for lower power stations is governed by two statutory provisions. The first is contained in the General Revision of the Copyright Law, Pub. L. 94–553, 17 U.S.C. 101 *et seq.* (1976), redefining the rights of, and limitations upon, copyright owners in the use of their works. Essentially, non-cable retransmissions, with the exception of those by governmental or non-profit entities, are subject to full copyright liability. Sec. 325(a) of the Communications Act permits the rebroadcast of programming only if the rebroadcasting station has obtained the consent of the originating station. Although rebroadcast consent needs to be sought, the Commission has held that it may not be withheld without justification. On occasion, we have considered whether the refusal was justified, depending upon the facts of the particular case and an evaluation of the circumstances involved.[24] We believe

[16] The most important distinguishing requirement is that an originating low power station must be attended by a qualified operator. Translators functioning unattended may not originate beyond emergency warnings and 30–second segments each hour. *See Report and Order* in BC Docket No. 78–252, released on May 28, 1980, 77 FCC 2d 1006 (1980). This distinction constitutes the definition of a "translator," which would be but one type of low power station.

[17] *Report and Order* in Docket No. 15971, 13 FCC 2d 305 (1968).

[18] *See* generally Switzer; *see* also the descriptions by Teasdale of low power originations in Alaska, New York State, and Canada.

[19] *Wrangell Radio Group, et. al.*, FCC 79–868, released on January 17, 1980, para,. 10.

[20] "Comments" of Kitchen Productions, Ridgecrest, California, November 27, 1978, p. 1.

[21] See *Part IV.B* of the *Report.*

[22] *See* FCC, Network Inquiry Special Staff, Video Interconnection: Technology, Costs and Regulatory Policies (Preliminary Report, March 1980).

[23] *Report and Order* in Docket No. 20539, 67 FCC 2d 209 (1978). Previously, translators had been limited to a very simple AM heterodyne conversion of the rebroadcast signal onto another frequency.

[24] This includes:

Footnotes continued on next page

that these existing provisions, regarding copyright and retransmission consent, are adequate to establish an initial assignment of program rights, so that low power stations will be free to enter the marketplace for programs and to privately negotiate appropriate arrangements for the program services they may offer.

28. A special case is presented by commercial substitution for television programming broadcast by conventional stations that generally are financed by advertiser support. We do not believe that a low power station should be permitted to engage in commercial substitution without the consent of the primary broadcast station. It does not follow, however, that all examples of substitution are harmful. In fact, the originating broadcast station actually may be better off with some commercial substitution by translators, because without it they might not get the additional coverage for the remainder of their advertising provided by the translator. Moreover, commercial substitution may be desirable from a communications policy perspective because communities that could not otherwise support translator or low power station operation may find commercial substitution a promising solution to the problem. Thus, we propose to permit commercial substitution, but only if the consent of all affected parties is obtained and compliance with copyright law is achieved.[25]

29. One major concern that must be addressed before we permit translators to originate programming and to collect subscription fees is the effect that increased competition may have on existing television service. This issue has been studied by the staff and *Parts IV.C* and *IV.D* of the *Report* dealing with it are quite illuminating. That analysis strongly suggests that it would be possible to achieve the contemplated increase in service without a detrimental impact on existing service. The various sections of the *Report* have considered the impact of competition of new low power over-the-air service upon cable TV and on other translators and low power stations. We find this analysis a persuasive one.[26] We believe that those parties claiming adverse economic impact must show how the effects of competition would harmfully affect the public, before obtaining any relief.

30. We believe that our proposed rules in particular can encourage competition between low power stations and cable television to deliver new and expanded services to the public. Realizing the benefits of competition, we have acted to liberalize many of our cable rules.[27] We now believe that protection of local broadcasters from cable competition was a self-defeating enterprise, and have changed our cable rules to reflect that. Even if it did help local broadcasters escape the impact of competition, this protection came at the price of denying the public the benefits of new services on the cable. In the same way, we have concluded that it is counterproductive to attempt to shield cable from the rigors of competition with low power broadcast. We believe that the time has come to establish a parity of free and open opportunities for translators and low power stations to compete not only with cable television systems, but with other distribution technologies as well. We believe that competition between low power television and cable television and others will encourage each to build upon its unique strengths. Cable is most efficient in delivering a large number of channels to areas of comparatively dense population, and in overcoming congestion of broadcast frequencies. Low power broadcast television will be particularly important in serving sparsely settled areas, in other locations where full service broadcast stations and cable are not in a position to increase program choices, and in some densely populated urban areas where the cost of laying cable is extremely high.

31. *Low Power Pay TV Operations.* Currently, translators are forbidden to alter a rebroadcast signal deliberately so as to make it inaccessible to conventional home receivers.[28] This rule precludes the use of scrambled programming to collect subscription fees. Based on the record, it appears that this ban has retarded the growth of television service, especially in rural areas. In many of these areas cable also is not feasible because of the sparseness of the population, compared with the high cost of laying cable. Translators also may not be able to respond to gaps in service, because the translator operator needs a source of funds but does not have the opportunity to require payment of a monthly subscription fee. The translator signal is available to anyone in the coverage areas, whether they contribute to the operation of the station or not, and some viewers—perhaps most—will elect to take a "free ride" rather than contribute to supporting the service. Thus, unless this problem can be overcome, translators will have limited financial viability.[29] We believe that allowing scrambled programming to be delivered via low power broadcast technology could enable communities to overcome the chronic difficulties of remote communities in securing an adequate financial base for their local television service. In this way, it could provide support for a larger and more diverse menu of television. Service improvements also could be expected in urban areas where subscription low power stations could cater to unmet demands for specialized programs. We do not believe it is necessary to require a separate STV authorization for low power stations or for translators selecting this method of financial support. Rather, STV would be inherent as an option in the low power television service, and the use of this service option would need only a minor modification of the station's license.

32. Even though we are concerned about a loss of "free" television, it does

---

Footnotes continued from last page

"* * * whether licensees of stations, through express or implied agreements or understandings, act in concert with each other or with other interests in refusing rebroadcast requests whether requesting stations serve the same or a different area as the station whose program they wish to rebroadcast, whether the request is for permission to carry a simultaneous rebroadcast or to rebroadcast a program at some subsequent date, whether the requesting station has indicated a willingness to pay a reasonable share of the legitimate costs of the originating station, whether or not other persons having interests in the program have requested or agreed to the rebroadcast, and whether the program concerned has public service aspects that make its wide dissemination to the public clearly desirable." *Memorandum Opinion and Order* in Docket No. 9808, 17 FR 10309, 1 RR 91:1136 (1952).

[25] This issue marks another distinction between the translator and the low power station. The translator may operate unattended through an exception in Sec. 318 of the Communications Act. Congress has indicated that in doing so, it should not engage in commercial substitution. See *Report and Order* in BC Docket No. 78–252, released on May 28, 1980, 77 FCC 2d 1006 (1980). The low power station, which would have a qualified operator, is not availing itself of this privilege and can negotiate with the primary station to achieve any mix of substitution that could be agreed to by the parties. The only modification that we would make to the 30-second origination allowed currently for translators would be the deletion of any specified technology of accomplishing it.

[26] Subsequently, in paras. 37–41, we propose to liberalize many of the multiple ownership rules applicable to translators. Both full service stations and cable systems would have new competitive opportunities, using low power technology themselves, under our proposals.

[27] *Report* in Docket No. 21284, 71 FCC 2d 632 (1979), *Report* in Docket No. 20989, 71 FCC 2d 951 (1979); and *Notice of Proposed Rulemaking* in Dockets 20988 and 21284, 71 FCC 2d 1004 (1979), and *Report and Order* adopted on July 22, 1980 (FCC 80–443).

[28] Sec. 74.731(d) of the rules.

[29] The potential advent of direct satellite to home broadcasting may have a significant effect on rural television service in the long term, but it would not make sense to forego important opportunities here and await this development at some unknown future date.

not serve the public interest to preclude pay service in competition with free, over-the-air, service. Equally, the public interest would not be served by artificial limitations upon the ability of advertiser-supported or tax-supported service to compete with pay television service. In our view, a mixture of advertiser-supported, tax-supported, and pay TV service is the pattern of distribution most likely to maximize consumer welfare from television. STV provides options and diversity unavailable from free television. We expect that the current fare of free television programming will continue to be available to the overwhelming majority of television households.[30]

33. For several reasons we believe that the potential loss in television service to viewers if unlimited STV operation is permitted in these communities is likely to be minimal. First, many of these communities already receive service from full service television broadcasters. Second, some of these communities already are paying for translator service either through elaborate voluntary contribution systems or through mandatory tax systems. In such cases there might be nothing more than a change in the payment mechanism more equitably distributing the cost of service to those desiring it, and actually enjoying it. Third, even if the schedule of programming presently offered by translators were to be scrambled, there is sufficient spectrum space in rural areas so that free rebroadcast television service could be provided from other sources. Fourth, given the high level of community interest in providing translator service in many communities today, local origination becomes a real possibility for these communities with the support that a scrambled system could provide. For all these reasons we believe that translator service, with a free choice for the licensee between a profit-motivated and a non-profit basis, could result in a totality of service that is more responsive to consumer demands. It could offer better signal quality and a more diverse selection of available television programming.[31]

34. Four other areas of possible regulatory intervention must be considered if we permit translators and low power television stations to collect subscription fees. They are: (1) Should we set standards for technical compatability? (2) Should we set any requirements of a minimum number of hours of free programming? (3) Should we call for the filing of franchise contracts? and (4) Should we require the leasing rather than selling of decoders? As to the first, we do not foresee any need at the present time to require scrambled translators or low power stations to conform to one chosen technical method of operation. We believe that the rigors of the marketplace will be more effective in shaping good technical performance than regulatory intervention, especially in light of the infancy of the industry and the scarcity of technical information upon which to rely.[32]

35. Currently we require full service STV stations to provide some "free" programming to consumers. However, we do not believe this requirement should be placed on low power television stations. Imposition of such a requirement could curtail the provision of the service, and it seems to us consistent to impose no minimum of "free" programming, just as no minimum amount of programming is proposed generally for low power stations. We also currently require full service STV applicants to submit the terms of agreements and arrangements that the applicant intends to have with other parties concerning the supply of subscription programs. This rule was adopted to insure that the broadcast station retains full control over the programming chosen for broadcast. We continue to believe that this is an important concern, and would specifically require than any such agreement be consistent with the rules applicable to full service programming agreements, § 73.642(e). Even so, we do not believe it is necessary for low power subscription television stations to submit these agreements. However, we are willing to consider whether it would be appropriate to arrange for access to them on a local basis so that the public can be aware of their terms.

36. We currently require full service STV broadcasters to lease rather than sell decoders to consumers. The *Report* recommended that, in the absence of an identifiable cause of market failure, this decision is best left to the individual investor. However, it also recommended that, if sale be the choice, the purchaser should receive a written explanation that the contemplated STV service is secondary. This appears to strike a reasonable balance at the onset of new service. The Commission currently is reviewing its lease-only policies for full service STV operations.[33]

37. *Ownership.* Currently, the Commission has four ownership eligibility restrictions or requirements for translator licensees. *First,* a commercial television broadcast station cannot own or financially support a VHF translator not operating on an assigned channel in the Television Table of Assignments if that translator is located in a distant television market.[34] *Second,* a cable television system cannot own a translator licensed to the same community as the cable system.[35] *Third,* translators operating at a maximum permissible power, on a channel in the Table of Assignments, normally will be authorized only to licensees of television broadcast stations unless other parties can demonstrate that they have capable technical personnel available to assure satisfactory technical quality and the avoidance of harmful interference.[36] *Finally,* no one may own or operate a VHF translator in an area receiving satisfactory service from a UHF television station or a UHF translator unless such intermixture is determined, exceptionally, to serve the public interest.[37]

38. As the analysis in the *Report* shows, all of these ownership restrictions and requirements appear unnecessary and counterproductive in their present form. Indeed, problems with present multiple ownership rules, by themselves, are an adequate justification for the comprehensive revisiting of all of our translator policies, in which today's action is a significant step. A rule that forbids our full service UHF station licensees from extending their coverage by VHF translators, while full service VHF stations may do so, arbitrarily imposes added costs upon the

[30] We do not believe that it would be in the public interest to limit translator STV operation to cases where there are at least three or four free signals available in the community. This would preclude service just where it is most needed, in the absence of any evidence that unlimited low power STV operation would adversely affect viewer interests. *See* the detailed discussion in *Part IV.D* of the *Report.*

[31] As to the competitive ramifications, we believe it is important for us not to favor any one technology, especially since translators are using spectrum on a secondary basis. Therefore, we are not proposing to require cable systems to carry translator or low power station signals, whether scrambled or not. Any negotiation and settlement that is reached by individual parties concerning carriage would be accepted by the Commission.

[32] This approach is consistent with our treatment of full service STV service where we decided that "the public interest will be served by allowing STV operators the option of deciding whether or not to standardize their system or to offer decoders compatible with whatever other STV systems are serving the market." *See First Report and Order* in Docket No. 21502, adopted September 25, 1979; FCC 79-535.

[33] *See First Report and Order* in Docket No. 21502, FCC 79-535, adopted on September 25, 1979.

[34] Sec. 74.732(e)(1) and (2).

[35] Sec. 76.501(a)(3).

[36] Sec. 74.732(i).

[37] Sec. 74.732(d).

UHF licensee, and perpetuates its comparative handicaps. This rule stands as an illustration of nothing more than the haphazard develop of translator policies to this date. We do propose to retain two of the present rules in revised form. The others would be eliminated. We believe that cross-ownership between cable television and translators need not be precluded, but we propose to retain the exclusion of cable cross ownership, in their franchise area, for low power stations that originate programming and for both translators and low power stations using scrambled signals. Common ownership in such situations could well diminish the head-to-head competition expected between them because each is the likeliest source of new competition for the other. In addition, we propose rules that would prevent a full service station from owning an originating or low power station in its own service area and would bar a national network [38] from owning an originating station.

39. There was considerable uncertainty as to the competitive effect of translators upon the national television system in the 1960's, when the scope and direction of full service development were not yet clearly in view. However, we believe that these uncertainties have been resolved and that any reasonable fear of harmful competition has been allayed. The growth of translators can be expected to increase the availability of televison, especially in rural areas, and to provide local programming. We believe that a rule prohibiting broadcast stations from owning VHF translators in distant markets would stifle this opportunity and thereby disserve the public interest. The rule restricting the use of VHF translators in areas served by either UHF full service stations or by UHF translators also disserves the public interest. The selection of a frequency to use to serve the local community will be performed most efficiently, with maximum benefit to the public, if it is made by the individual operator or investor.

40. Section 74.732(i) of the rules provides that translators authorized to operate in the Table (at 100 watts for VHF; 1,000 watts for UHF) normally will be authorized only to the licensees of full service stations. Licenses are issued to others only upon a showing of technical proficiency. This rule should be modified in light of our proposal to remove any distinction in transmitter output power arising from operation in the Table and by our proposal to require attendance by a licensed operator.[39] Moreover, advances in the reliability of low power technology have obviated the need for a separate showing of technical competency. Finally, we must recognize the fact that the present rule restricts entry to only one class of licensees, thereby discouraging the free and open development of new services by other classes of licensees. This we view as contrary to the public interest.

41. Low power stations, because they have the ability to originate programs, should be treated as "voices" in the First Amendment sense, implying that the Commission's pro-diversity ownership rules would be applicable. We propose to apply "duopoly" and "one-to-a-market" rules, as these rules are applied to TV, AM and FM broadcasting. No license would be issued to an entity already owning a station in the low power or in another broadcast service where that would result in primary service contour overlap of the two stations as defined by § 73.636 of our rules. On the other hand, we are inclined not to place a limit upon "regional concentration of control," as it is currently employed in the broadcast services, nor would we limit a single owner to a total of seven stations. The latter requirement could prevent the upgrading of many existing translator services to low power status, and the concern for anticompetitive effects is lessened where the stations are both secondary and inherently limited in their coverage potential. We note that conventional translators are not subject to any of these ownership rules today, and we do not propose to alter that policy. For ownership purposes we would regard an STV station that only rebroadcasts—in encoded form—as a low power station, rather than a translator, subject to the duopoly and one-to-a-market rules. Finally, the multiple ownership rules we propose would apply equally to commercial and to noncommercial licensees. The ownership rules will significantly affect the future shape of the service, and we specifically encourage commenting parties to offer analysis of these proposals and the related discussion is Part IV. E of the Report which has informed our approach in this area.

42. *Programming Rules.* Unlike translators as they now exist, stations in the low power service would be able to originate programming. This raises the question of how to treat these stations in terms of the applicability of a series of requirements or policies.

43. As a general proposition, any statutory obligation or prohibition imposed upon broadcast stations must apply to translators and to low power TV broadcast stations. However, the manner in which such requirements are specified by Commission rule can and should be adjusted to reflect the actual nature and capabilities of the service. Certain statutory requirements would apply to low power stations in exactly the same fashion that they apply to every broadcaster. These include the prohibition on the broadcast of obscenity or lotteries. However, there are other areas where the statute impowers the Commission to enter the field of program regulation, consistent with the obligation to avoid censorship as contained in Section 326 of the Act, but does not require regulation of a particular type. In these areas, it is necessary carefully to weigh the goals of content regulation together with other statutory goals, including the ones that could be advanced by the inauguration of the proposed service itself. Perhaps the most important area of this type is the issue of rules appropriate to the implementation of the Fairness Doctrine in the low power television service, where we must balance carefully our goal of a new service with the minimum of regulatory oversight against the long established right of the public to be informed by our broadcast licensees.

44. Stated simply, the Fairness Doctrine is a requirement that broadcasters give fair and adequate attention to controversial issues of public importance in the community. That the attention of the broadcaster be "adequate"—an affirmative obligation to cover at least the most important of issues—commonly is spoken of as a "Part I" obligation. That the attention to issues be "fair" entails the provision of reasonable opportunities for the presentation of opposing views, a so-called "Part II" obligation.[40] The low power service that we are proposing would not provide a full range of services. Translators in this service essentially would not originate and low power stations that did choose to originate would not be required to do so to any minimum extent. Neither type of station would be required to have a studio. Accordingly, it appears reasonable in most instances to permit stations in the low power service to achieve compliance with the Fairness Doctrine by showing, in the case of a complaint, that they had accepted and broadcast a reasonable amount of responsive issue programming submitted

[38] For the definition of a national network, see § 73.658(l)(1)(v) of the rules.

[39] These proposals appear in our discussion of technical standards, *infra*, paragraphs 53 and 65–66.

[40] See, for example, *Fairness Doctrine*, 58 FCC 2d 691, 693 (1976).

to the station in a form or format compatible with the station's originating equipment, if any. The "Part II" Fairness Doctrine obligation usually could be met by a showing that a reasonable amount of time was made available for the presentation of contrasting views also submitted in a form compatible with the station's originating equipment, if any. There may be instances where a purely passive acceptance of material on a controversial issue would be inadequate, and where an obligation by the licensee itself to address the issue would be raised. In all cases, we would expect that the fairness obligation would be commensurate with the licensee's ability to offer a responsive forum, using the equipment and staff normally available to it. The obligation to afford the opportunity for opposing views would be incurred, regardless of whether or not a sponsor could be found to purchase time for such presentation.[41]

45. In the area of political broadcasting, we propose that compliance be measured in a fashion similar to the treatment of Fairness Doctrine obligations. That is, low power and translator stations would be required to provide reasonable access to, or to permit purchase of reasonable amounts of time by, legally qualified candidates for Federal elective office. However, we do not propose to require the station to provide production facilities, and see its duties as ending with the acceptance of political material furnished in any format compatible with the station's originating equipment. In all cases, once any legally qualified candidate for public office is permitted to use the facility, the requirements of Section 315 of the Communications Act would apply to access by opponents. This approach is a direct application of the current policy for translators, which are not required to offer political time if they do not originate, but must offer it in accordance with Section 315 if they do.[42]

46. The Commission's rules governing program content, in contrast to the statutory requirements, should be examined for their appropriateness in a secondary low power service. In general, we do not consider it appropriate to impose such obligations upon these stations. Several commenting parties urged that, given the nature of low power services, they should not be burdened with the types of requirements that apply to full service TV stations.[43] We agree with these parties with respect to non-entertainment programming guidelines, commercial limitations, and formal ascertainment for translator or low power station licensees. Even participation in the Emergency Broadcast System should be limited to simple requirements for directing viewers to another broadcast source of emergency information.

47. We do not believe that the Commission should require formal ascertainment in the low power television service. Ascertainment is not now required of translator stations. The low power station will have a small coverage area and typically would select a directional antenna to cover a specific pocket of local population, such as a valley floor or part of a city. The likelihood of familiarity with the service area by the licensee is much greater than is the case with full service stations, whose signals span a wider distance. Beyond this, formal requirements could impose too great a burden for these stations to carry.[43] Even though formal ascertainment would not be imposed, the Commission retains a statutory duty to find in initial licensing and at renewal that the station is serving the public interest. In this service, responsiveness to specialized needs and interests should be permitted, indeed encouraged.

C. Technical Standards

48. The proposed technical changes are designed to fit together to form a coherent whole. In fact, this interrelationship is a vital aspect of the proposal for, without it, we believe the new low power service is likely to falter. Commenting parties should take this into account. The Commission's experience in licensing translators provides a firm foundation for the technical proposals. For example, more than 2,400 VHF translators have been licensed, with no minimum mileage separations, and cases of objectionable interference are extremely rare. The technical proposals, as a whole, are refinements of existing translator policies and practices.

49. *Channel Selection.* The channel selection criteria for translators have evolved in minor increments since 1956, when translators were authorized only to Channels 70 through 83. With the reallocation of that band to the land mobile radio services in 1970, translators were encouraged to move "downward" to the highest available UHF channel. The discussion of channel assignments in the *Report* marks the first comprehensive analysis of translator assignments that has been available to us. It enables us to propose a general simplification of the standards for both VHF and UHF operations, while retaining the basic concept of secondary status to full service TV broadcast. Although relaxation of the policies in both bands is proposed, we recognize that the development of new service is likely to be concentrated in the UHF band where spectrum is more readily available. We propose to eliminate the requirement that a UHF translator applicant first look to Channels 55 through 69, and instead are inclined to permit the selection of any Channel from 14 through 69.[45] This change promises the more efficient use of UHF, and eliminates an engineering showing that places unnecessary burdens upon applicants and the Commission's administrative resources. We propose to eliminate the prohibition on VHF translators or low power stations in markets that are all-UHF. We do not believe that the benefits of a deintermixed local market are in any way placed at risk by the entry of a few secondary 10-watt or 100-watt stations. Admittedly, a unique situation is posed by all-UHF markets that the Commission specifically deintermixed. We specifically invite comments from interested parties in those markets. Although our starting assumption is that they should be treated the same as any other market, we will be attentive to any reasons that may be advanced for handling these localities under a separate standard. Finally, we propose that low power, like other TV broadcast stations, have access to auxiliary broadcast frequencies, where available, for studio-to-transmitter links and

---

[41] *See Cullman Broadcasting Co., Inc.*, 25 R.R. 895 (1963).

[42] See, *Public Notice*, "Acceptance of Political Advertising by UHF Translator Licensees", 62 FCC 2d 896 (1976).

[43] There is one important exception. Because of the ease with which even low power stations can achieve compliance, we propose that the Commission's rules regarding personal attacks apply in full to translator and low power stations to the extent that these stations do originate.

[44] During local origination, we propose that the station identify itself with a local telephone number where a person responsible for the station could be contacted. The *Report* stated that the question of whether this is an "ascertainment" rule or a "station identification" rule is a philosophical one, *see Part IV.F.*

[45] Our *Notice of Inquiry* in this proceeding stated that we would not revisit the reallocation of Channels 70 through 83, and no change in that approach is proposed here. New broadcast authorizations will not be made there, and translators operating there will be renewed on a secondary basis to land mobile radio. In addition, we will continue the present policy against authorization of major upgrading of translators now operating in that band. Although we have decided against a flat prohibition on the introduction of low power features to facilities at Channels 70–83, we caution applicants against making investments in frequency specific equipment there. Such applicants will not be heard to argue their investment as a reason for delaying primary land mobile radio use of the band, or even for retaining Channels 70–83 on the receiver dial. *See* UHF Comparability Task Force, *Comparability for UHF Television: Final Report* (September, 1980), pp. 106–117.

remote broadcast pickups. In some locations, a link would be essential if originations are to be carried on at all.

50. *VHF Station Power.* When VHF translators first were authorized in 1960, the transmitter power was limited to one watt. This power limitation was intended to minimize interference, particularly because no minimum mileage separation standards were established for VHF translators. In 1965, the rules were amended to permit 100-watt VHF translators to operate on vacant channels in the Table. The higher power reflected protection ensuing from the standard mileage separations between stations upon which the Table is based. For those not operating on a vacant assignment, the rules were amended in 1968 to allow transmitter powers of up to 10 watts for translators located West of the Mississippi River, including Alaska and Hawaii.[46] The one-watt power limitation was retained for stations located East of the Mississippi River because of the greater density of television stations and what was thought to be a greater possibility of interference.

51. Several commenting parties in this proceeding, including the Association of Maximum Service Telecasters (MST), have asked that we increase maximum VHF transmitter power to 10 watts for stations located in areas East of the Mississippi River. We have waived this rule on a number of occasions to permit 10-watt translators to operate at locations where interference was not likely to result. Not only has little, if any interference resulted, but also the additional power could offer real advantage in increased coverage. For these reasons, we propose to increase the maximum VHF translator power to 10 watts for stations located in areas East as well as West of the Mississippi River. We believe this step can be taken without causing interference to any existing television service. Applicants would be expected to exercise caution in selecting channels and site locations for new 10-watt VHF translators or low power TV stations. Currently, VHF stations operating on the Table must use 100-watt transmitter output, only. The *Report* argues for flexibility here, to allow a free range up to 100 watts, and we find this persuasive as an added source of choice to the applicant in designing an appropriate facility on those frequencies. In addition, the use of higher power, up to 100 watts, should be permitted to any VHF applicant that complies with the co-channel and adjacent channel minimum mileage separation applicable to full service operations, regardless of whether or not a full service channel happens to be assigned there in the Table.

52. *UHF Station Power:* The rules currently allow UHF translators to operate at transmitter powers of up to 100 watts on "unlisted" channels, outside of the Table. Translators using output channels listed in the Table must have a transmitter power of 1,000 watts, only. The National Translator Association and other commenting parties have requested us to increase the power limitations to 1,000 watts for stations that are not operating on listed channels. NTA contends that this higher power could bring service to a wide area more efficiently, thereby lessening the need for translator chains.

53. When we amended the rules to permit UHF translators on "listed" channels to operate at transmitter powers of 1,000 watts,[47] we agreed with the efficiency arguments with respect to the use of 1,000 watts. Even so, we were then reluctant to extend the 1,000-watt limit to UHF stations operating on channels not listed in the Table, fearing that such a policy could result in a high potential for interference to existing television service. In the past nine years, we have gained considerable experience in licensing UHF translator stations, and the record is virtually silent as to reported interference. For that reason, we are now inclined to increase the maximum UHF transmitter power to 1,000 watts, for translators and for low power TV stations, regardless of whether or not they operate on a listed channel.[48] It is not the assignment of a channel in the table that determines that interference will be avoided. Rather, it is the mileage separations, effective radiated power and antenna height requirements implicit in the Table. By definition, the requirement of a listed channel is a wasteful one, particularly where secondary status itself is used to assure interference protection, because the protection it offers is based on a full-power operation. For these reasons, we believe that it is desirable to unbind the relationship between station power and placement in the Table for VHF and for UHF. We also propose to eliminate the rule requiring UHF translator stations in the Table to employ transmitter powers of 1,000 watts only. We would leave the selection of a transmitter power to the applicant's own judgment.[49] Finally, the provision in the translator rules precluding use of the "fifteen mile rule" to employ a location within that distance from an assigned channel location should be deleted, to enable the licensee to select an appropriate site.[50]

54. The minimum mileage separations for translators, as they have evolved, reveal a complete paradox. For VHF, there are no minimum mileage separations. Avoidance of interference is imposed by secondary status and by certain injunctions in the Rules that the VHF translator operator must not select a channel that would interfere, and in fact must not interfere. For UHF, employing the maximum transmitter power of 100 watts outside the Table, a translator operator must fully comply with all of the existing UHF "taboos"—which were designed to minimize mutual interference between stations operated at maximum facilities of one million watts. This is, to say the least, a regime predicated upon an excess of caution. In practice, more than 2,400 VHF translators have been authorized in a more congested band, under more imprecise standards. Yet the interference problems resulting appear to have been minimal. At the same time, the tough UHF standards have discouraged UHF translator development—a result that has been contrary to our consistent policy since 1956, when we began authorizing translators solely at UHF. For VHF, we propose to retain the current general protection against interference for translators and for low power stations. With respect to UHF, the record and the staff work afford a basis for developing new criteria that are more realistic.

55. We believe that it is possible to develop standards to use in the prediction of interference. As early as 1971, in the *Report and Order* in Docket No. 18861, we indicated that it might be possible to reduce the mileage separations or "taboos," applicable to UHF translators, but said that we would have to wait until related technical studies had been completed. Now, on the basis of a study of television receiver performance performed at our laboratory facility in Laurel, Maryland, we are in a position to propose changes to the current mileage separation

[46] See *Report and Order* in Docket No. 15971, 13 FCC 2d 305, 13 RR 1577 (1968).

[47] *Report and Order* in Docket No. 18861, 47 FCC 2d 628 (1971).

[48] Because of the power gain of the antenna used, the station's effective radiated power might be as much as 30 kW ERP in the main direction of radiation.

[49] The *Report* contended that authorization should continue to be made for transmitter output power, rather than effective radiated power. However, to give the Commission's records more practical utility, for example, in reviewing any reported interference, it urged that this be included as a term of the authorization. Such a requirement appears reasonable to us, and should not be burdensone in practice.

[50] Sec. 74.702(g) and Sec. 74.702(b)(2), incorporating by reference § 73.607(b) of the rules.

standards.[51] Basically, we propose to offer applicants a two-step UHF selection procedure. First, an applicant should attempt to comply with the current separation standards. But, second, if this is shown to be infeasible for reasons of spacings or because all channels are occupied, we would accept a supplemental engineering study in lieu of compliance with the mileage separation requirements specified in § 74.702(c) of the rules.

56. the current separation standards are premised upon the use of full power by full service stations. As an alternative, we propose the use of desired-to-undesired (D/U) signal ratios as determined in the 1974 study. The maximum allowable level of the undersired F(50,10) signal at the full service station's calculated Grade B contour is found by subtracting the applicable D/U ratio from the desired F(50,50) signal level of 64 dBu V/m. In demonstrating that undesired levels are not exceeded, applicants unable to find an interference-free UHF channel in compliance with all of the minimum mileage separations should be required to employ the Commission's F(50,10) curves; or a "free space" propagation model or the F(50,50) curves for distances of less than 10 miles. Applicants could meet the required ratios by any combination of antenna directionality, antenna height, ERP, and frequency offset. Terrain shielding could be considered on a case-by-case basis. The following table indicates the values for maximum undesired F(50,10) signal that would have to be met in any such calculations:

Channel of broadcast station relative to the low power station	D/U ratio (dB)	Maximum level of undesired F(50,10) signal at Grade dB (uV/m)
Co-channel (n)[1]	45	19
Adjacent channel (n±1)	−15	79
Sound image (n−14)	−23	87
Picture image (n−15)	−6	71
Intermodulation (n±2,3,4,5)	(2)	(2)
Oscillator (n+7)	(3)	(3)

[1] "n" refers to the power channel in question. The co-channel D/U ratio of 45 dB generally is considered appropriate for stations not operating on frequency offsets. A ratio of 28 dB would apply where stations proposed operations of the basis of 10,000 Hz ±1,000 Hz offsets.

[2] Minimum separation of 20 miles.

[3] Minimum separation of 60 miles.

57. The *Report* indicates that a low power station would have to be extemely close to a full service station for interference to occur as the result of IF beat. We invite comment on the *Report's* recommendation that this taboo be inapplicable to low power and translator stations. We also propose, as indicated by the table, not to "protect" stations 14 and 15 channels above a low power facility, for reasons of sound image or picture image interference, or to protect channels seven below from oscillator radiation. In practice, it is an engineering fact that the interference travels only oneway toward the lower channel. While full service stations should be protected from mutual interference on the "image taboos" criteria, the low power applicant can make the choice of whether or not to be concerned with incoming interference without the need for a Commission rule constraining use of UHF frequencies.

58. We hope to facilitate efficient spectrum usage through the application of innovative engineering approaches to the planning of translator and low power stations, including the effective use of directional antennas and natural terrain shielding. In offering this proposal for licensing UHF translators we have relied upon our licensing experienoe in the VHF band, where mileage separation standards are not applied to translators. We are encouraged by the apparent lack of interference that has resulted. With this history in mind we are hopeful that this proposal for UHF channel selection would not lead to interference if applicants take proper care in the selecting of channels and in their engineering of transmitting facilities.[52]

59. *Interference.* As the Comments of MST indicate, "interference" can occur occasionally under freak conditions, as when reception of a regular station is being attempted at a very substantial distance from the television broadcast transmitter (for example, greater than 100 miles). In such cases, MST believes that it is unreasonable to require the translator to suspend operation. Its view is that in cases where there is no reasonable expectation of reception of the desired station, the trnaslator should not be required to go off the air to end the interference. We agree, and would expect that secondary status for all low power stations, including translators, can be enforced adequately by requiring the licensee's prompt cooperation in tests to determine the source of interference, and in the corrective action that may be necessary.

60. Sec. 74.703(a) provides for different treatment of interference occurring between VHF translators and that occurring between UHF translators. New UHF translators must protect existing UHF translators from interference, but if interference occurs among VHF translators, licensees have been expected to resolve the problem by mutual agreement. This implies a type of "seniority system" with UHF, but not with VHF. Upon reflection, we do not believe there is a substantial basis for this distinction. We would continue to expect them both to cooperate with one another in such matters. A priortity for the low power station first entering service should apply when disputes cannot be resolved by mutual agreement. The assignment and power proposals, described already, are intended to remove artificial distinctions among low power stations that would turn on whether or not they are operating within the TV Table. Consistently with that, we propose to eliminate the priorities among translators that are accorded by the rules, favoring those in the Table in cases of mutual interference. The general low power to low power interference criteria already described should apply to these cases, as well.

61. In the *Notice of Inquiry* in this proceeding, we specifically invited cable television parties and others to report to us on any conditions of objectionable interference arising from translator operations. *See* paragraph 20 of the *Notice.* A great deal of declamatory assertion issued from the cable parties on this point, but they completely failed to respond to the call for evidence. At length, the National Cable Television Association, in its *Reply Comments,* was able to support its general claims of

[51] W. K. Roberts and L .C. Middlekamp. A study of the Characteristics of Typical Receivers Relative to the UHF Taboos. NITS PB–235 057 (June, 1974).

[52] We propose no changes to the current policy of permitting translators to locate without minimum mileage separations, either between themselves or to cable TV head ends.

massive interference with documentation of two instances. The *Report* examined these in detail, and found them to be caused by operations outside of the Commission's technical rules. This is a proper subject for the Commission's complaint procedures, but, if anything, it is supportive of the contention that the existing rules are adequate to disclose and proscribe interfering conditions. Nevertheless, we propose a rule that low power stations should not be authorized where it has been demonstrated that interference to an existing cable television service, at the head end, will be caused. Cable parties as yet have not shown that this is likely to be anything but an issue in isolated instances. The proof to be offered in opposition to an authorization would have to be clear and convincing, in view of the ease of taking corrective action after the interfering conditions has been identified and measured in the field. Finally, where interference does arise in practice we propose three rules:

1. The low power station operator is strictly responsible for taking immediate corrective action where an interfering condition to any other service results from operations in violation of the Commission's technical standards, or from improper maintenance.

2. The cable operator should be responsible to correct interference at the cable distribution system and at the subscriber's set.[53]

3. The first-come-first-served principle should govern conditions of interference between a low power station and reception to a cable television headend. Where possible, a solution should be found by mutual agreement upon the lowest cost solution, and the sharing of any burdens from taking corrective action.

62. Finally, we propose that translators and low power stations no longer be required to suspend operations until it has been established that they are not at fault with respect to any condition of interference to another television service. It strikes us as inequitable to make the low power station the automatic "prime suspect" where objectionable interference arises. It should be adequate to require that the low power station cooperate promptly in tests to determine the source of objectionable interference. In summary, we would treat complaints of interference to CATV systems caused by low power stations or translators in the same manner as complaints involving interference among translators or low power stations. In general, we would hope that situations of interference could be resolved by mutual agreement among the affected parties. Where such agreement cannot be reached, we would continue to intervene and require remedial action if that becomes necessary.

63. *Transmitter Standards.* We are concerned primarily with maintaining those standards necessary for the prevention of objectionable interference. Additional standards that are calculated to maintain a first-rate quality of signal into the home appear to us neither necessary nor desirable. Rigorous standards may preclude the service altogether in some instances, and we have every confidence that the operator will attempt to make his or her use attractive to viewers. For these reasons we specifically reaffirm our rules that protect against out-of-band emissions, and that require good frequency tolerance. We propose to extend these standards to low power stations, and to require all low power stations that employ modulators to comply with the transmitter rules applicable to full service stations, § 73.687 (a) and (b), as translators currently do. The only relaxation in these standards recommended in the *Report* was to require that the wave form characteristics be the same, incoming and outgoing, instead of requiring conformity of the outgoing signal with a specified modulation envelope, and we agree that this should be adequate.[54] Translators and transmitters in this service should continue to be type accepted. Finally, in view of the extensive treatment given the frequency tolerance and interference issues in the *Report,* and the resolution of the subject proposed here, we are dismissing a petition for rule making on tolerances as moot.[55]

64. The foregoing rules are expected to assure the avoidance of objectionable interference. With that in mind, we are able to leave a fair degree of latitude to the operator on the quality of the service, and the monitoring and test equipment that would be necessary. We do not propose to apply the full compliment of full service station transmission standards in § 73.682 to the low power television service. Specifically, we are not inclined to create standards here for sync pulse and blanking wave forms, or color mixture, or audio distortion.[56] Stations involved in STV operations should employ FCC certified equipment for decoding, but there are no added STV transmission standards for full service stations, and we propose none for low power stations.

65. *Station Operation, Identification, and Maintenance.* Since 1960, when Congress amended the Communications Act specifically for this purpose, translators have enjoyed an exception to the statutory requirement that broadcast stations be attended by a qualified operator, 47 U.S.C. 318.[57] The low power television service we are proposing may be well beyond what Congress had in mind with this particularized exception. For this reason, we propose to require an operator for all low power television stations. Unattended operation would only be permitted for translators operating in the traditional mode, and not originating beyond 30 seconds per hour. Indeed, this requirement of an operator, pursuant to law, is the principal difference between the regulatory framework for translators, and for low power stations. The addition of a modulator to a translator adds few new complications, and the degree of operator involvement required by our *Report and Order* in Docket No. 20539 [58] should suffice: observation of the off-air signal by a person designated by the licensee for ten continuous minutes each day, using a conventional TV receiver at a convenient location.

66. In contrast, the low power station will require the direct involvement of an operator. The *Report* distinguished between an imported signal by FM microwave feed, and a local origination, from a videotape player, film chain, camera, or other local source. For the former, the *Report* recommended a direct application of the rules for microwave feed, as adopted in Docket No. 20539, but requiring the monitoring to be done by a person holding at least a Restricted Permit. For the latter, it recommended that a person so qualified be actually present at the transmitter site, at a remote control point, or at the program source. The distinction appears reasonable to us, and should pose the

[53] Not only is the cable operator the one best able to correct the condition, through shielding or otherwise, but the claim that delivery in the home warrants spectrum protection belies the entire theory of cable regulation founded upon cable not precluding other uses of broadcast frequencies.

[54] Translators limiting their originations to emergency warnings and 30-second fundraising appeals should continue to be exempt from any wave form criteria.

[55] Petition by KOAT Television, Inc., filed on February 22, 1972 (RM–1932).

[56] For discussion of these, *see Part IV.B* of the Report. The *Report* suggested "minimal" standards, for example that the channel be 6 MHz and that the number of scanning lines per frame be 525, and this seems to us adequate.

[57] The Commission is currently re-examing its operator requirements for all broadcast services. Some requirements have been eliminated and significant deregulation proposals are outstanding for others. *See Report and Order* in Docket No. 20817, FCC 79–721, November, 1979.

[58] 67 FCC 2d 209 (1978).

minimum burdens upon the originating station licensees.

67. The *Report* and the record in this proceeding indicate significant advances in the reliability of modern translator technology. We also note, however, that equipment designed to function reliably, even while unattended, must receive adequate maintenance. We propose to require that translator and low power licensees be required to conducted measurements of the carrier frequencies of their outgoing channels at least once a year and as often as necessary to assure compliance with the Commission's frequency tolerance standards. The aural carrier frequency of modulator-fed stations also should be measured. On the other hand, we would agree with the *Report* in considering it adequate to permit factory measurement of the modulation characteristics, rather than field measurement, and in allowing proof-of-performance certification to be made by Second- as well as First-Class Radio Telephone Operators.

68. The final technical issue to be considered is station identification. The format and time of station identification seem to us significant, the type of equipment to be used of minor importance. We propose to continue the current translator rule that specifies hourly transmission of the call sign in International Morse Code or identification by a primary station being rebroadcast. During local originations, we propose to require some type of identification by a local telephone number where a person responsible for the station can be contacted. We do not propose to require any particular equipment configuration to place the station "ID" onto the broadcast.

D. The Authorization Process

69. We are not proposing any minimum hours for the low power television service, nor do we make any distinction as to the type of financial support. Rebroadcast and origination, tax support, advertising and STV all are inherent as service options in this proposed new service. The goal of rapid and flexible development of the service, in response to public needs, will not be realized if the administrative process for securing an authorization itself is slow and cumbersome. *Part V* of the *Report* contains a number of recommendations to streamline and simplify the process of awarding permits and licenses. While we propose to follow the approach recommended there, interested parties should have ample opportunity to present specific alternatives. We intend to give particular weight to comments that advance procedures complementary to the goal of expeditious development of the service.

70. The *Report*, in *Part V*, recommends several steps that are designed to eliminate costly and protracted comparative cases. Any party filing a mutually exclusive application would be notified, and given 30 days to amend, specifying other facilities. If the party did not amend, the staff would have authority to attempt to work out an agreement in a "pre-designation conference." If these efforts are unavailing, a "paper hearing" would be held, in which applicants would present written evidence upon questions of basic qualification, conformity of their applications with our Rules, and on three and only three, simple and easily applied comparative criteria. The criteria would be of equal weight and would be cumulative, toward a preference for a particular applicant. The applicant who first filed a complete and sufficient application would receive a preference. The applicant under minority ownership and control greater than 50% would receive a preference. Finally, the noncommercial applicant proposing a noncommercial service for the general public would receive a preference.[59] Thus, the paper hearing in a contested case would end with findings as to which of the applicants were basically qualified, and a finding that one qualified applicant was entitled to an authorization because it had more comparative preferences than any of the others. If use of the three comparative criteria did not disclose a "winner," the case would be referred for a lottery, with each applicant having an equal chance to receive the authorization.[60]

71. We note that our staff recommended the three criteria as a "first draft" set of preferences, and propose them in that spirit. We shall carefully consider comments that advance other approaches to the comparative process balancing, as we must, the statutory goals of "fair" as well as "efficient" distribution of service.

72. The purpose of this overall approach is to avoid head-to-head competition among applicants, with its profound drain upon the resources of the parties and the administrative agency. We want to emphasize the early stages of settlement and agreement, and to de-emphasize the lottery, which we would hope need be invoked in a small minority of initially contested cases. Prior to the use of the lottery, a set of clear and simple bases for a preference should foster settlements, by foreshadowing a probable outcome to all concerned. As proposed, the party that has taken the initiative to first perfect an application is accorded a preference. The minority applicant and the noncommercial applicant are accorded a preference, as well.

73. The first filing raises at least an equitable interest by the party that seized the initiative, and who first prepared engineering analysis and other showings. This would be entitled to some weight in the comparative setting. For the preference to operate successfully, it could only be earned by the first filing of a complete and sufficient application. Criteria for this cannot be stated with certainty until a low power construction permit application form is adopted to suspersede the TV translator form, FCC Form No. 346. We invite commenting parties to suggest procedures and criteria that would comport with efficiency and fairness if this preference is used comparatively. We wish to be clear that the first filing preferance is not a reward for the submittal of a hastily prepared application. To operate successfully, the preference would be available only to the applicant meeting rigorous standards of completeness and sufficiency. A significant public interest benefit of the preference would be an overall improvement in the quality of applications as applicants endeavor to earn the preference by submitting complete and accurate applications, thereby speeding service to the public and relieving some administrative demands upon the Commission's resources.

74. We propose that a preference be accorded to applications by noncommercial entities, because we believe that non-profit operations have had an important role in the development of translator service, including pioneering efforts in origination, in Alaska and elsewhere. We want to assure strong noncommercial participation in the low power television service, cooperatively with public broadcast interests.

75. We invite public broadcasting parties to comment on any reasonable steps we could take to coordinate our

[59] In paragraph 38, *supra*, we proposed to permit certain types of cross ownership between cable and translators and low power stations. However, in a comparative case that reaches the paper hearing, we believe that cable ownership in the same locality should be disqualifying, because any other licensee could be expected to provide a new source of competition. Translator ownership in the same locality also should be disqualifying.

[60] We presently contemplate that none of these preferences would apply in a contested license renewal. We have assumed that the procedures and applicable law for renewals would be identical to those now applied for translators. We specifically invite comment on the comparative renewal process.

findings of financial qualification with the cycles of grant funding through the National Telecommunications and Information Administration and the Corporation for Public Broadcasting. We also encourage public telecommunications parties to begin planning now for the advent of low power television service, and to indicate in their comments whether they contemplate interconnection arrangements for these stations. Finally, we agree with the *Report* that in the early stages it is desirable to keep open a wide range of financing possibilities, and state that we do not rule out low power applications by noncommercial entities that would be supported by taxes, voluntary contributions, or even subscription fees. The *Report* makes it clear that the noncommercial area involves many statutory questions. These are best treated by the parties charged with statutory duties in public telecommunications, but we encourage early planning, and are ready to assist in securing a meaningful noncommercial role in the low power television service. We hope that these parties will continue to be active in this proceeding, and that they will furnish us with sufficient details regarding their own plans to enable us to complement and to strengthen their development of new noncommercial offerings in this service.

76. We also propose that a preference be accorded to applicants that are owned and controlled by minorities. The experience in Alaska and in northern Canada described in the *Report* and in Teasdale suggest that the low power television service may be an important instrument for responding to the needs and interests of particular audiences that are underserved by available television broadcast service, both in urban and rural areas. Already, the Commission has received many expressions of interest from minority groups and individuals regarding the use of low power technology to develop new service and new ownership opportunities. We specifically encourage this interest, and fully intend that the inauguration of this new broadcast service be the occasion for assuring enhanced diversity of ownership and of viewpoints in television broadcasting.

77. Under current rules, a party is not permitted to convey its permit or license within three years of the initial grant.[61] The advent of a new television service, accompanied as it is by many uncertainties, does not seem to us an appropriate place to apply this rule. Individuals and groups willing to assume the risks of development are conferring a benefit upon the public. If their calculations are not borne out, they should have the opportunity to convey to another developer who may have a more efficient plan for implementing new service. A limitation upon conveyance may cause spectrum to lay idle for reasons of that limitation, alone. In addition, this service presents us with a rare opportunity to test the efficacy of a free-transferability policy. As experience is gained, we may later decide to institute a limit, but presently we are unsure as to what the appropriate limit would be, and so do not propose to specify a rule against "trafficking." [62]

78. *Interim Handling of Applications.* Finally, we address the policy that we intend to follow during the pendency of this proceeding. We do not believe that a "freeze" on low power applications would serve the public interest. Certainly, the routine uncontested translator application should contine to be processed. In addition, we have pursued a liberal policy of waiver in the past, and have no reason to depart from that now, where applicants propose low power features, and offer a public interest justification for waiver. The staff will continue to process routine applications and will grant waivers in accordance with existing precedents or will refer novel applications to the Commission for determination on an *ad hoc* basis during the pendency of the rulemaking. All grants, including conventional translator grants, will be conditioned upon the outcome in rulemaking. The Commission will reserve the right to modify or to terminate any such authorizations upon 60 days notice after the release of any final report and order in this proceeding.

79. The staff will defer action on any application, seeking waiver, that is inconsistent with the technical standards or the ownership rules of the proposed Low Power Television Service. Because the comparative criteria and comparative procedures both are the subject of rulemaking, no mutually exclusive applications can be processed through to a grant during the pendency of this proceeding. Only after comparative criteria and procedures are finally established for the service could they then be applied to resolve mutually exclusive cases. We caution applicants that the grant of novel applications can only be done within the Commission's administrative resources. To avoid giving any premium to an interim filing, we would in no event use a first-filed preference in cases involving applications filed during the pending of the rulemaking. If we finally adopt a preference for a first filed application, we intend it to apply only when every application in a group that is mutually exclusive was filed at least 30 days after the release of a final report and order in this proceeding. Thus, we preserve the status quo by assuring that there never will be a comparative premium for the earliest filing arising during the pendency of this rulemaking.

80. If it should appear that an applicant during the interim is making filings merely to store a large quantity of TV broadcast frequencies, or where there is intrinsic or extrinsic evidence of an anticompetitive pattern of applications, we reserve the right to defer action until we have the benefit of a full record on the ownership and other issues, and have adopted final rules informed by that record. In short, we are not encouraging or discouraging interim applications, so long as applicants understand that they may in no way impinge upon our ability to respond in full to the record being developed here.

81. We encourage the submission of other suggested approaches that could be used to provide the maximum benefit from low power television and translator operation. It may be that modifications of the approaches we propose could even better serve the public interest in extending TV coverage and in providing enhanced program diversity. This applies particularly to the bases for a preference, and generally to the administrative procedures we propose here. Those proposing new approaches are asked to offer an analysis of their benefits in fulfilling the goals of the service and not simply to offer them as "bare-bones" alternatives.

V. Procedural Matters

82. Accordingly, Comments on the various proposed changes in the Commission's rules are invited to be filed not later than January 15, 1981, and Reply Comments by March 1, 1981. This action is taken pursuant to the authority contained in Sections 4(i) 303(b)(c)(g) and (r) of the Communications Act of 1934, as amended.

83. Pursuant to applicable procedures set forth in § 1.415 of the Commission's rules, interested persons may file

[61] Sec. 73.3597 of Rules.

[62] On the other hand, it is not spectrally efficient to encourage licenses to be held solely for resale, as opposed to use. We expect every broadcast permittee and transferee—in the low power television service as in others—to exercise due diligence in pursuing its plan for the implementation of service. The application is for the purpose of specifying a plan for actual service, and we treat that plan as a serious representation to us of the applicant's intentions. Undue delay in pursuing construction would be inconsistent with this representation. Without a rule against trafficking, the failure to construct in a timely manner should result in the cancellation of the construction permit.

comments and reply comments by the dates indicated. All relevant and timely comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision, the Commission may take into consideration information and ideas not contained in the comments, provided that such information or a writing indicating the nature and source of such information is placed in the public file, and provided that the fact of the Commission's reliance on such information is noted in the Report and Order. The contact person for further information regarding this proceeding is Michael Couzens in the Broadcast Bureau, 1919 M St. NW., Washington, D.C. 20554 (632–6302). However, members of the public should note that from the time a notice of proposed rulemaking is issued until the time the matter no longer is subject to Commission consideration or court review, *ex parte* contacts presented to the Commission in proceedings such as this one will be disclosed in the public docket file.

84. In accordance with the provisions of § 1.419 of the Commission's rules, an original and 5 copies of all statements, briefs or comments filed shall be furnished the Commission. Responses will be available for public inspection during business hours in the Commission's Public Reference Room in its headquarters in Washington, D.C.

85. Finally, it is ordered that the petition by KOAT Television; Inc., mentioned in para. 63 of this Notice, is dismissed as moot.

Federal Communications Commission.[63]

William J. Tricarico,

Secretary.

September 9, 1980.

Separate Statement of Chairman Charles D. Ferris

Re: Low Power Television Broadcasting

A month ago, the Commission removed the regulatory weeds of the last decade by freeing the Cable Industry from regulatory oppression. Today the Commission is planting in their place seed for hundreds of new television stations.

Low power television broadcasting, the first new broadcast service considered by the FCC in 20 years, offers the same intriguing possibilities as the advent of commercial television broadcasting in the late 1940s. It poses an exciting challenge to commercial and noncommercial entrepreneurs of creating programming to make the new service attractive to Americans.

Lower power TV offers a chance to add new TV services for our citizens, primarily over UHF channels that today go wanting because, due to the construction and operating costs of full power operation, they cannot be viable as full service UHF channels. For smaller communities, it means first local TV outlets or additional UHF outlets that might someday become full service stations. For the larger cities, it means additional choices from the TV fare they now get.

The proposals developed by the commission's staff are highly innovative. They propose unlimited multiple ownership, and do away with requirements like ascertainment, maintaining a studio or providing local origination. Operating requirements—and thereby operating costs—will be kept simple. No extra authorizations would be necessary to operate these stations on a subscription television basis. And simplified paper hearings would be employed to speed up the assignment process.

This proceeding should encourage new program ideas. The much reduced costs of low power operation, compared to start-up of a conventional TV station, along with the narrowcasting possibilities of targeting specific service areas, should attract a new breed of broadcaster, and broadcast networks, that are priced out of TV today.

We have already received applications for spanish language service and other minority-oriented networks, which we today have authorized our staff to process expeditiously, and many other potential commercial and noncommercial applicants have made their interest known. Citizens in Alaska are already receiving additional service through low-power TV operations we have previously granted through waiver of our translator rules. Other entrepreneurs should find this new marketplace a welcome opportunity, and citizens in other areas, both rural and urban, can likewise benefit from adding new television services to meet their specialized interests.

Concurring Statement of Commissioner Robert E. Lee

In re: Low-Power Television Broadcasting, BC Docket No. 78–253

I concur in issuance of this Notice of Proposed Rulemaking because it offers the promise of more viable translator operations and fosters innovative uses of the television spectrum. The proposed secondary status for these stations effectively eliminates any concern I might have had regarding degradation of regular service, which is in marked contrast to the documented effects of interference from short-spaced VHF drop-ins, also addressed today. While I am peripherally concerned about the potential impact that such stations may have on UHF development, I will reserve judgment until the record has been developed in response to this Notice.

I hope that this Notice will stimulate a lot of comment about this proposed new service. As is the case with any major revision of our rules, many of the details need a lot more thought. I hope the commenters will focus some of their attention on the procedures for handling any comparative cases which may arise and on the proposal to give preferences on the basis of race or because of a noncommercial format. Both these matters concern me, and I would benefit greatly from comments of the parties.

Finally, I am concerned that potential applicants for low-power stations have not been alerted adequately to the prospect that such stations may exhibit *very limited service areas* due to interference from regular stations. While this isn't a reason to deny anyone use of one of these channels, I don't want anyone to misunderstand what this low-power proposal really means. It certainly isn't going to be a license to print money.

Concurring—in Part—Statement of Commissioner Abbott Washburn

Re: Inquiry Into the Future Role of Low Power Television and Television Translators in the National Telecommunications System, BC Docket No. 78–253

The absence of any limitation on the multiple ownership of this proposed new service is inconsistent with the Commission's limitation on AM, FM and television stations. Currently, ownership of those services is limited to seven of each per licensee. Such limits have proved valuable in encouraging diversity of voices and ownership of facilities. A similar provision should have been included here for low power television. Nevertheless, I am concurring in the issuance of the Notice without limitation on multiple ownership of the new low power service. At this writing, I am inclined to favor a reasonable limitation on this service if it becomes a reality and before we are forced to consider grandfathering systems which would exceed whatever limits we might impose later. I encourage and seek comments for and against the advisability of limiting the multiple

[63] See attached Statements of Chairman Ferris, Commissioner Lee, Commissioner Washburn and Commissioner Fogarty.

ownership of low power television from any interested party, and will consider all such carefully before casting my vote when this proposal returns to us for a final determination.

Separate Statement of Commissioner Joseph R. Fogarty; Concurring in Part

In re: Notice of Proposed Rulemaking Looking Toward the Creation of a New Low Power Television Broadcast Service

I believe the proposed creation of a new Low Power Television Service is well-conceived in its basic concept and outline. The record developed in response to the *Notice of Inquiry* in this proceeding provides substantial assurance that low power television will offer a significant opportunity for enhanced service diversity and minority ownership without jeopardizing the technical or economic integrity of the existing full service television station system.

At the same time, however, I have serious reservations concerning the manner in which this new service would be implemented. In particular, the authorization process proposed by this *Notice* raises several difficult legal and policy issues, and because the proper resolution of these critical issues is at this juncture by no means clear, I only concur in this part of the Commission's action.

The *Notice* proposes authorization (i.e., licensing) procedures designed to minimize cases of mutual exclusivity and to avoid oral comparative hearings. Where "consultation" procedures fail to discourage or avoid mutually exclusive applications, only three comparative factors would be considered: Comparative preferences of equal and cumulative weight would be awarded to (1) the applicant who first files a complete and sufficient application; (2) non-commercial applicants proposing a non-commercial service; and (3) minority owned and controlled applicants. Applicants would *not* be allowed to compete in terms of the technical or service attributes of their respective proposed operations. In the event that comparative preferences thus awarded did not determine a "winner", a lottery would be held to determine the grant of license.

While I am sensitive to the concern that a new Low Power Television Service not be stifled by the delay and costs attending the oral comparative hearing process, I must question whether this "streamlined" procedure—and particularly the prescription of only these three limited comparative criteria—is in sufficient conformity with the Commission's statutory licensing responsibilities.

Under the Communications Act, the Commission, in passing upon an application for a permit to construct a broadcasting station, must judge by the standard of the "public convenience, interest, and necessity." [1] In construing this statutory public interest standard of broadcast regulation, the courts have observed that "Comparative analysis is implicit in any scheme of allocation and has always been at least formally a consideration in broadcasting licensing." [2] Thus, in *Ashbacker Radio Corp.* v. *FCC*,[3] the Supreme Court firmly established that under Section 309(e) of the Act where two or more applications are mutually exclusive, there must be a joint comparative hearing.

Following *Ashbacker*, the courts have held that the "full hearing" requirement of Section 309(e) includes "a decision upon all relevant criteria": [4]

> [T]he findings must cover all the substantial differences between the applicants and the ultimate conclusion must be based on a composite consideration of the findings as to each applicant.[5]
>
> "A choice between two applicants involves more than the bare qualifications of each applicant. It involves a comparison of characteristics. Both A and B may be qualified, but if a choice must be made, the question is which is the better qualified * * *
>
> "* * * Comparative qualities and not mere positive characteristics must then be considered.
>
> * * * * *
>
> "* * * The Commission cannot ignore a material difference between two applicants and make findings in respect to selected characteristics only * * * It must take into account all the characteristics which indicate differences, and reach an over-all relative determination upon an evaluation of all factors, conflicting in many cases * * *" [6]

Section 307(b) of the Act also provides a guide to the proper discharge of the Commission's licensing responsibilities:

> In considering applications for licenses, and modifications and renewals thereof, when and insofar as there is a demand for the same, the Commission shall make such distribution of licenses, frequencies, hours of operation, and of power among the several States and communities as to provide a fair, efficient, and equitable distribution of radio service to each of the same.

In *FCC* v. *Allentown Broadcasting Corp.*,[7] the Supreme Court ruled that Section 307(b) requires that when mutually exclusive applicants seek authority to serve different communities, the Commission must first determine which community has the greater need for additional services and then determine which applicant can best serve that community's need. In *Pasadena Broadcasting Co.* v. *FCC*,[8] the Court of Appeals for the District of Columbia Circuit observed that the facial language of Section 307(b) "applies not only to changes in the structure of spectrum allocation, such as grants of new licenses or modifications, but to license renewals as well," and adjures the Commission to "consider the propriety of allocation 'when and insofar as there is demand' for service." [9] Based on this analysis, the court concluded that the "Satisfaction of these statutory commands is not, nor ought it to be, a one-time thing, for the balance of demand for service will shift among communities over time." [10] The *Pasadena* court also noted that because "Local transmission service bestows such important benefits," Section 307(b) has been consistently interpreted * * * virtually to ensure an applicant for first local service preference over one who proposes merely to complement preexisting local operations." [11]

These statutory provisions embody the fundamental principle that the comparative process is designed specifically to ensure "the best practicable service" to the public by licensees of broadcast facilities. The critical importance of this principle was stated by the Supreme Court in *National Broadcasting Co.* v. *United States* [12] in a passage which especially warrants full quotation here:

> The facilities of radio are limited and therefore precious; they cannot be left to wasteful use without detriment to the public interest. "An important element of public interest and convenience affecting the issue of a license is the ability of the licensee to render the best practicable service to the community reached by his broadcasts." *FCC* v. *Sanders Radio Station*, 309 U.S. 470, 475. The Commission's licensing function cannot be discharged, therefore, merely by finding that there are no technological objections to the granting of a license. If the criterion of "public interest" were limited to such matters, how could the Commission choose

[1] *FCC* v. *Pottsville Broadcasting Co.*, 309 U.S. 134 (1940).

[2] *Central Florida Enterprises, Inc.* v. *FCC*, 598 F.2d 37, 41 (D.C. Cir. 1978).

[3] 326 U.S. 327 (1945).

[4] *Citizens Communications Center* v. *FCC*, 447 F.2d 1201,1212 (D.C. Cir. 1971).

[5] Greater Boston Television Corp. *v.* FCC, 444 F.2d 841, 851 (D.C. Cir. 1970), *cert. denied*, 403 U.S. 923 (1971).

[6] *Citizens Communications Center* v. *FCC*, 447 F.2d at 1212, quoting *Johnston Broadcasting Co.* v. *FCC*, 175 F.2d 351, 356–57 (D.C. Cir. 1949).

[7] 349 U.S. 358 (1955).

[8] 555 F.2d 1046 (D.C. Cir. 1977).

[9] *Id.* at 1051 n. 39.

[10] *Id.*

[11] *Id.* at 1050–51 (Footnote citations omitted).

[12] 319 U.S. 190 (1943).

between two applicants for the same facilities, each of whom is financially and technically qualified to operate a station? Since the very inception of federal regulation by radio, comparative considerations as to the services to be rendered have governed the application of the standard of "public interest, convenience, or necessity." [13]

When measured against these statutory requirements and interpretative judicial precedent, the proposed assignment and licensing procedures for the new Low Power Television Service are problematical, to say the least. The *Notice* issued by the Commission seems to acknowledge that we are required to evaluate and decide all "substantial relevant differences" between competing applications; however, while first filer status, minority ownership and control, and non-commercial status and operation represent significant "public interest" applicant attributes, they are by no means exhaustive of such characteristics. In this regard, I must question why proposed service and technical operation characteristics are not to be deemed "substantial and relevant" to the ultimate public interest in the use of these new low power television frequencies and thus entitled to comparative evaluation. Again, it bears emphasizing that " 'The Commission cannot ignore a material difference between two applicants and make findings in respect to selected characteristics only * * *' " [14] "[C]omparative considerations as to the services to be rendered * * * govern[ ] the application of the standard of 'public interest, convenience, or necessity.' " [15] If service and technical attributes do not count in the process of determining "best practicable service," what do?

I also find troublesome the "equal weighting" of the three "comparative" factors proposed by the *Notice*. As the courts have repeatedly held, where a choice must be made between two or more competing applicants, "* * * the question is which is the *better* qualified." [16] A proper determination of this ultimate issue requires that the Commission consider "Comparative qualities and not mere positive characteristics * * *" [17] This clearly means that the Commission "must take into account all the characteristics which indicate differences, and reach an *over-all relative determination* upon an evaluation of *all* factors, conflicting *in many cases.*" [18] First filing status, minority ownership and control, and non-commercial status and operation are "mere positive characteristics," and it strikes me as extremely doubtful that in any given case an "equal weighting" of these factors among competing applicants would suffice as the "overall *relative* determination" which the statute and interpretative case law commands. Section 309(e) and its surrounding precedent implicate a more searching and refined comparative analysis. Moreover, while *"no hearing* need be held where an application fails to measure up to the Commission's rules and does not indicate waiver," the Commission is not authorized "to deny *qualified* applicants their statutory right to a *full hearing* on their own merits." [19] The "equal weighting" process cannot be easily squared with this "full hearing" requirement of the statute.

From the standpoint of Section 307(b)'s requirements, there is an implicit suggestion in the *Notice* that comparative evaluation of service and technical differences would increase the delay and costs of the authorization process and thus impinge on the "efficient" distribution of new low power television facilities. However, the Commission cannot emphasize the "efficient" distribution of these limited facilities to the exclusion or nullification of the statutory command that this distribution also be "fair" and "equitable." In this regard, judicial holding has firmly rejected the "notion" that Section 307(b)'s requirement of "fair, efficient, and equitable" spectrum allocation is "a tailsman whereby the rigors of a comparative hearing may be avoided if only grounds for decision can be found that smack of 'efficiency'—or, presumably, 'fairness' or 'equity.' " [20]

Two hypothetical—but plausibly foreseeable—cases illustrate the flaws and difficulties which may be inherent in the authorization process tentatively proposed by the Notice:

Assume there are three low power television channel allotments available in the Detroit, Michigan, area. Also assume that two of these three allotments have already been granted to minority owned and controlled applicants pursuant to the proposed three-factor preference criteria. Assume further that the third and remaining channel is applied for by another minority applicant and a non-minority applicant proposing to serve the Polish-American enclave of Hamtramck (a city within the city of Detroit) with Polish-language and -ethnic programming. Under the limited three-factor criteria, the minority applicant would receive a preference and the competing applicant would not (unless it was the first filer or non-commercial). If the minority preference were determinative of the contest, or led to a lottery in which the minority applicant prevailed, how could this process and result be squared with the most elementary principles of "fair" and "equitable" distribution of television service? Would not a grant to the minority applicant in this case be *prima facie* irrational, arbitrary, and capricious?

Assume a "first filed" application by a non-minority, commercial applicant proposes a pure translator operation while another non-minority, commercial applicant proposes a primarily local origination service. The process and criteria proposed by the *Notice* would dictate that the pure translator service be preferred over the local origination service proposal. But, how could this process and result be reconciled with the statutory goal of "best practicable service" and the judicially recognized Section 307(b) preference for local transmission service?

I believe that a few cautionary observations are also appropriate on the *Notice's* tentative preference for paper hearings and lotteries in structuring a special authorization process for the new Low Power Television Service. The Commission's authority to resolve mutually exclusive comparative proceedings on the basis of the competing applications and pleadings responsive thereto, without oral hearings, has never been fully explored. I think the public interest would be well served by pursuing the procedural and statutory implications of this issue in this proceeding. At the outset of this inquiry, it should be noted that the "full hearing" requirement of Section 309(e) does not necessarily implicate a full oral or evidentiary hearing in all cases. The test should be one of substance, not mere formality. If the Commission can make a rational, principled, and thorough evalution of the basic and comparative characteristics of the competing applicants on the written record alone, I see no statutory or administrative requirement that the Commission nonetheless must hold an oral hearing before making its choice. This, of course, may only state the critical issue, that is, whether the written record joins substantial and material questions of fact concerning the basic and comparative merits of the competing applicants which can be satisfactorily resolved only in the

[13] *Id.* at 216–17.
[14] Citizens Communications Center, *supra* n. 6.
[15] National Broadcasting Co., *supra* n. 12.
[16] Citizens Communications Center, *supra* n. 6 (Emphasis added).
[17] *Id.*
[18] *Id.* (Emphasis added).
[19] *Id.*, 447 F. 2d at 1212 n. 34 (Emphasis in original).
[20] Pasadena Broadcasting Co., 555 F.2d at 1052.

crucible of an evidentiary hearing allowing for the introduction of oral testimony and cross-examination. This issue, in turn, brings us back to the fundamental question of comparative standards and criteria. In my judgment, this is, in any case, where we should begin the inquiry on the limits and constraints of the "full hearing" requirement.

The inquiry here should focus on identifying and refining the comparative criteria so that their application may be amendable to a paper process yet fully responsive to the paramount public interest goal of "best practicable service." My fundamental problem with the *Notice's* proposal is that it appears to tilt this endeavor improperly and unnecessarily in favor of expediency (or, less perjoratively, "expedition") and away from the full public interest analysis which I believe both statute and precedent command. The task of developing and justifying a paper comparative process is certainly herculean and may prove ultimately futile. But, a serious attempt by both the Commission and the competing public is clearly called for.

These preliminary observations on paper hearings are also applicable to the *Notice's* apparent penchant for lotteries in "deciding" comparative cases. While a lottery may be an appropriate and lawful alternative in resolving genuinely "deadlocked" comparative proceedings, the Commission cannot evade its responsibility for making refined public interest judgments where that more rational and less arbitrary mode of decision-making is clearing available and applicable. Here, I believe it axiomatic that *resolution by lottery or chance is the very antithesis of the system of rational, principled determination which has been the hallmark of administrative law and process.* As the Supreme Court has so plainly stated:

> Congress has granted applicants a right to a hearing on their applications for station licenses. Whether that is wise policy or whether the procedure adopted by the Commission in this case [which the Court invalidated] is preferable is not for us to decide.[21]

Before the Commission rushes to embrace the "easy out" of lottery, we have a clear statutory obligation to exhaust the search for public interest criteria to distinguish and choose among applicants so as to effectuate the "best practicable service" standard of the Act. Such an effort is the absolute minimum required as a legal and policy predicate for utilizing a lottery in the licensing process, and any attempt to evade the requirement will put in peril the integrity of this Commission's mandate and process.

It is extremely important for the Commission to continue to address these critical issues of comparative criteria and procedure in the course of this rule making proceeding. I urge the fullest public analysis and comment on these concerns.

[FR Doc. 80-32407 Filed 10-16-80; 8:45 am]

BILLING CODE 6712-01-M

[21] Ashbacker Radio Corp., 326 U.S. at 333.

THE PRACTICAL WORLD OF DESIGNING, OPERATING LPTV

History has a way of repeating itself. When the first post-war commercial television service began in the United States in 1946 fewer than a dozen television stations were on the air. By 1948 the number of authorized (by the FCC) stations had risen to 107 and while television had also begun in Mexico and Cuba there was no television in Canada until the fall of 1952.

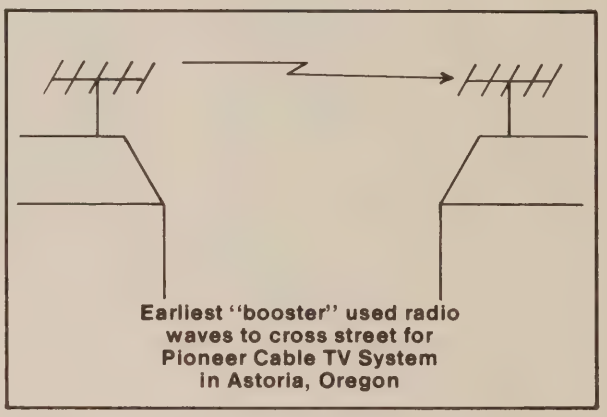
Between 1948 and 1952 no new television stations came on the air in the United States; the result of a decree by the Federal Communications Commission that stopped all new station activities while the FCC sorted out a TV channel allocation mess. In that period people who lived 'just beyond the fringe' of normal, dependable television service became intrigued with having television. To satisfy this intrigue and craving a number of new companies offering new products came into being. Firms such as Winegard, Blonder Tongue, Jerrold, TACO and Channel Master (among others) discovered that people who lived where television was not locally available were willing to spend as much money for an 'antenna rig' as they would spend for the actual television receiver. And sometimes much more. Out of this came the 'fringe area television industry' which endured and prospered until at least the early 1960s.

As the fringe area industry suppliers became more sophisticated new opportunities arose for extending the fringe area to new regions. Apparently the first efforts in this 'new frontier' were in Astoria, Oregon along in the fall of 1948. There a creative sort of electronic experimenter set out to bring television to his community. The only television in the Pacific northwest was a single channel located in Seattle; nearly 150 miles away. By probing around on nearby hilltops he found a weak signal but unfortunately it was some distance from his home and Astoria proper. After some more probing he found an even weaker signal very close to his home. He ran a cable from the antenna to his home and became one of the first in the state of Oregon to have television. After weeks of having a living room filled with people nightly he decided there had to be a way to **share** that reception with the neighbors. For those people located on his own block he merely ran cable to them. When the signal got weak he installed a booster amplifier and then ran more cable. Pretty soon he ran out of block and went to the Cityfathers in Astoria to seek their permission to cross a street or two with his cable. The City fathers were concerned about the request and while they delayed responding the experimenter decided to see if he could 'jump' over the street by connecting a small yagi antenna to the cable on one side and then crossing over to the opposite side to install an identical antenna to catch the signal.

It worked.

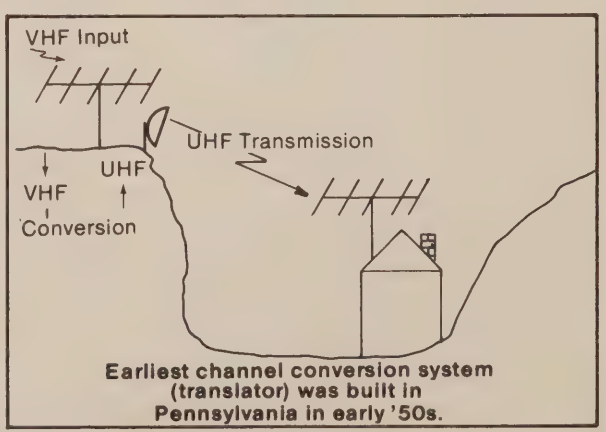
Within the cable television industry the Astoria, Oregon system is generally accepted to be the 'first CATV system in the world'. A plaque there commemorates the fact. However, it turns out that by crossing streets with very low power transmission equipment the pioneer cable system operator was **also** probably the first person in the world to create a 'booster/translator' television transmission system.

The experimenter attempted to market both his knowledge in cable and his knowledge concerning re-transmission through the air. The latter attracted the interest of the Federal Communications Commission which warned him that any transmitter, no matter what power level, must be licensed by the FCC. Effectively, they shut him down in the signal re-broadcasting department although they left his cable operation alone. At about the same time the City of Astoria granted him permission to cross streets with cable so his own personal interest in re-transmission systems disappeared since the need had disappeared as well.



Earliest "booster" used radio waves to cross street for Pioneer Cable TV System in Astoria, Oregon

Around a year or so later another group in the hills of Pennsylvania took another approach to transmitting TV into a 'shadow' area. Whereas the Astoria, Oregon 'system' boosted the signal on the **same** channel, the Pennsylvania group hoped to avoid the 'feedback' problem by receiving on one channel and then re-broadcasting on another. In this instance they received a standard VHF channel and frequency converted the TV channel intact to a new **UHF** channel (which in those days was an 'experimental band' of frequencies not yet licensed for regular TV use). The UHF channel was then amplified and transmitted over a region around 10 miles long by 2 miles wide from a nearby hilltop. Because nobody had UHF TV receivers in those days the enterprising Pennsylvania group built up UHF 'converters' and sold or rented them as a means of raising funds for the system. They got along, quietly, for a couple of years until a national electronics magazine picked up on the story and wrote elaborately about it. That brought in the FCC which praised their electronic abilities but condemned their lack of regard for the law. And they closed it down.



Earliest channel conversion system (translator) was built in Pennsylvania in early '50s.

With publicity the technology spread. Primarily in the west and Rocky Mountain states at first. Both techniques ('boosting on channel' and 'translating to a new channel') were employed. The equipment pressed into service largely came from the then growing cable television industry. Through a cable television equipment source you could purchase the necessary antennas, amplifiers and even channel converters and by plugging everything together in the right sequence you could send television into a valley or over a hill where it was not otherwise available. The FCC took a very dim and quite narrow minded view of all of this and repeatedly issued stern warnings that **any television device** transmitting through the air must have FCC approval. Then in the fine print they stated that devices such as were being used could not be licensed since there was no provision in the FCC rules for such devices.

Some people found this statement un-American. If such devices made television reception possible and the devices were generally available, it was the fault of the FCC that they could not be licensed; not theirs!!! By the late 1950's nearly 1,000 such devices were operating and the FCC was about to run out of field agents to shut them down. The Commission between 1956 and 1958 reportedly shut down several hundred; they would simply confiscate the equipment. However after most such 'raids' the local people simply dragged a fresh set of equipment out of their closets and re-installed their system. They figured confiscation was simply one of the risks of having television.

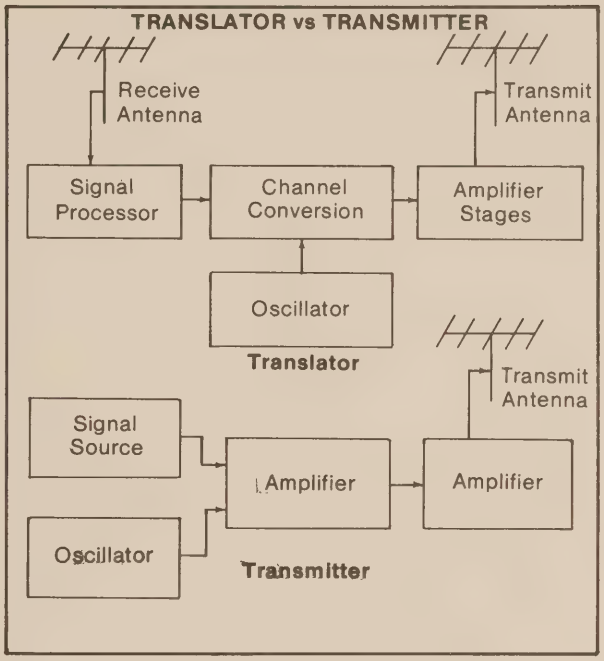
The FCC finally relented in 1960 and authorized both VHF and UHF translators; and UHF boosters. VHF (on-channel) signal boosters were outlawed. Everyone operating either a booster or a translator system was given 18 months to 'come into compliance' with the newly adopted regulations and most of them did so since it meant an end to equipment confiscation.

Low power television (re) broadcasting stations represent a small but significant part of the US (and Canadian) broadcasting industry. There are approximately 3,000 such 'stations' licensed in the USA although all told they may serve no more than one million people. Virtually all such systems are located in rural or 'shadow' type fringe areas where without the system(s) television service would be very poor or not exist at all. In a few instances television stations own and operate translators as a means of filling in 'gaps' inside of their own primary servie areas. There are UHF translators in New York City and Miami for example operated by local TV stations.

From the very beginning of the service however there has been but a single 'format' for the service; that being, translators **relay programs** fed to them by a broadcasting station. They do not create their own programs or transmit programs created locally in the translator service area.

All of that has now changed. With the proposed FCC rule making announced in the fall of 1980 the way is now established for individuals, groups, businesses or other entities to build and operate their own low power (100 watt or less at VHF; 1,000 watt or less at UHF) television broadcasting station. With the recent development of low cost satellite television terminals the marriage of satellite fed signals and low power television broadcasting promises an entire new generation of broadcast services in America. An exciting new industry is just now starting and to support that industry there will be new innovations in video processing and video transmission equipment not even dreamed of today.

This is an area for people who do not feel uncomfortable working where others have not worked before. This STT Handbook is our first manual in this area and it represents a combination of what is practical and do-able today with the types of equipment and operational formats we can expect to see develop in the coming years. At the time of preparation of this Handbook the FCC is just starting to process the more than 3,000 applications for licenses which have flooded their 'in baskets' since the announcement of this new service. The future, truly, is all in front of us.



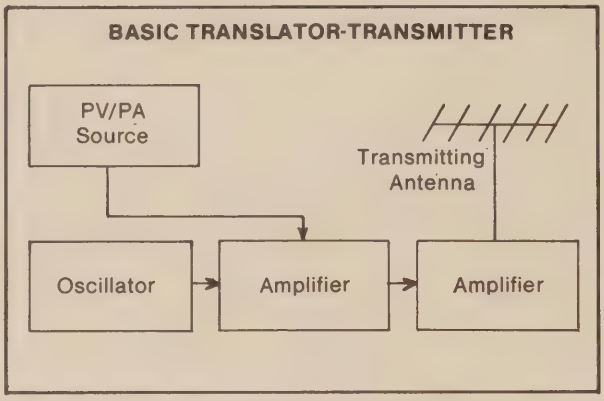
Out In Front - Again

While the US Federal Communications Commission is just **now** beginning the task of sifting through the mountain of license applications in this service a pioneering system virtually identical to the types of systems this Handbook will describe has been in operation in the Turks and Caicos Islands by author Bob Cooper. Thus many of the start up problems you might expect to experience on your own have already been experienced by Cooper and this allows us to report to you from the 'real world' of hard earned personal experience rather than some lofty theoretical base.

Let's begin by reducing the whole system to the most basic and absolutely essential parts:

1) **A signal source** - no television station can broadcast unless it has something to broadcast. We'll call that something "a baseband video signal and a baseband audio signal". And because that is a mouth full we'll shorten it to 'program video' and 'program audio'. Finally to abbreviate that we'll refer to them as **PV** and **PA** from this point forward.

PV can be any source of video; a test pattern, a camera gazing out of your front window, the (video) output from a tape deck, or the (video) output from a satellite video receiver. The PA could come from a microphone, a tape deck, a record player, an FM tuner, a satellite receiver or some other unlisted source. It is technically possible to transmit without PV and PA; you simply turn on the transmitter and you have a 'carrier wave' (or blank carrier) sent into the air. But lacking PV and PA you'll not be transmitting any "intelligence" so we'll assume



that you want to have PV and PA at all times.

2)**A transmitter** - your PV and PA won't go very far without some medium of transmission. The **only** type of 'signal' that will travel **through the airwaves** is a radio frequency (or RF) signal. And the only way to create such an RF signal is to have an RF transmitter. An RF transmitter is designed, on purpose, to operate on a specific frequency (channel). You select that channel, as we shall see, to be certain that others don't interfere with your signal and you don't interfere with other signals being transmitted in your region.

A transmitter has a number of important sub-parts. The PV and PA are plugged into the transmitter. They provide the 'modulation' or 'intelligence' for the transmitted wave. The transmitter first develops a very low power carrier wave (**no intelligence**) which is placed on a specific frequency or channel by a precision device called an oscillator. After this very low power carrier wave is created the oscillator signal is sent to an amplifier stage to boost the power of the carrier wave. It is here that the PV and PA are 'married' to the carrier wave. After this point we have an 'intelligent wave' (i.e. with information present). If you plugged a television receiver into the transmitter at the oscillator section you will get a signal but it wouldn't say anything to you (visually or audibly). If you plugged the television in at, or, after the stage where the PV and PA are 'married' to the carrier wave (called modulation) you'd get regular television. Then the now intelligent wave is sent through one or more additional amplifier stages to build up the power to a level which is strong enough for the signal to carry through the air; provided it is attached to a proper transmitting antenna.

3)**A transmitting antenna** (system). The best transmitter is useless without an antenna to launch the intelligent (modulated) wave into the air. The antenna, like the transmitter, is designed to function best on a specific frequency or channel. It is also designed (typically) to 'have gain'. It does this by adopting some 'directional characteristics'; that is, it takes the transmitter RF energy and funnels or channels that energy in a desired direction. An antenna gets its 'gain' **by focusing** the RF energy present in a specific direction or number of directions. The analogy here is the difference between a garden sprinkler that sprays water in all directions, or a nozzle that points the water in a single direction. The nozzle, like the directional antenna, does not really "amplify" the water pressure; it merely makes sure that all of the pressure available heads in one (desired) direction.

Not every installation does of course want to directionalize the transmitted signal. Those that do not still require an antenna; only the antenna required here is akin to the garden sprinkler, squirting signal in all directions, 360 degrees around the transmitter location. We'll talk a lot about directional antennas because they tend to be favored in low power applications for a number of reasons.

Those are the basic elements. PV and PA because that is where the 'intelligence' comes from; the transmitter because this is the power generator that determines the operating frequency and provides the carrier wave for the PV and PA to travel along on; and, the antenna because this is the portion of the system that 'launches' the signal into the air. You can be operational with nothing more than these elements plus some wire and cable to interconnect them altogether.

Through The Air

The air is a 'medium'. That is, it has composition (content) and it has the ability to 'support' RF signals that travel through it. Unfortuantely it is not a perfect 'transmission' medium and some of the energy or strength of the transmitted wave that launches from the transmitting antenna is lost in the air.

Let's change our fuzzy concept of RF signals to something we can identify with more readily; water. Replace the transmitting antenna with a nozzle on a hose. If you stand directly in front of the nozzle at a distance of 1 foot all of the water power hits you over a small area of your body. Assume it is hitting your stomach; the stomach gets very wet in a hurry but your head does not. Now move back from the nozzle and start over, at a distance of 20 feet. Now when you stand in front of the hose the thin, hard stream from the nozzle has spread out. **Some** hits your stomach (at less strength than before at 1 foot) but some now also lands on your head and feet. The further you stand away from the nozzle, the larger the area wet by the hose since **as the water travels away from the nozzle it spreads out.**

RF waves function in the same manner. Right in front of the antenna they are very strong. The further you back away from the antenna the weaker they become because the power (water) available is less than it was directly in front of the antenna; but now, further away, that power must cover an increasingly larger and larger area.

One more non-moving (i.e. static) water analogy. Take a one gallon container of water and pour it into a bath tub. There is barely enough to cover the bottom of the tub with a thin layer of water. Now start over and use a ten gallon container of water. The water in the tub is now several inches deep. The water in both cases expanded to cover all of the bottom of the tub; the area available. But because we started with more water with the ten gallon container we ended up with deeper water than with the one gallon container.

The depth of the water is analogous to our RF signal power as measured within a specific area. Substitute one watt of transmitter power for the one gallon of water and ten watts of power for the ten gallons of water. Substitute the geographic boundaries of your town for the bathtub.

1)**A clear**, un-obstructed transmission path through the air from our transmitting antenna to as many of our viewers as possible.

In the television game they call this 'line of sight' which simply means that if you stand on your tower with your eyes level with your transmitting antenna, your signal will reach

anyplace your eyes can see. A hill in the way and you can't see over the hill? Your signal will either not be present on the 'back side' of the hill, or, it will be far weaker there than it would be in the same spot if the hill could suddenly be moved away. A tall building in the way? Same story. Anything that sticks up in the path of the signal, between the transmitting antenna and the receiving location is going to reduce or diminish the transmitter signal.

2)**A reasonably efficient** receiving antenna at the viewer's location. Just as the transmitting antenna 'launches' your signal into the air, so too does a receiving antenna 'snatch' the signal out of the air; in reverse. Television braodcasting has always been a two party game; the station operator does everything he can to place a strong, 'clean' signal into the airwaves while the viewer does what he has to do (but seldom any more than that) to deliver a strong, clean signal to his receiver.

3)**A lack of interference to the frequency** or channel selected, from other television transmitters, from nearby two-way radio transmitters or from electrical appliances which unintentionally create interference to television (and radio) reception.

We have direct control over only one of these elements; the selection of an operating frequency or channel for our transmissions. If we do this carefully we can assure ourselves that within our coverage area we can be protected from interference to our own programming transmissions by other television transmitters operating in our area. Of course the reverse is also true; by keeping ourselves from being interfered with we also usually assure that our television signal will not interfere with **other** television signals available in our area.

Finding A Channel

Before anything else can really begin you must find (as in identify) an operating frequency/channel for your station. There are two ways to do this:

1)**Hire a professional firm** to study all of the available FCC channel allocations and assignments in your area and to determine (usually with the aid of a computer search program) just what channel(s) you do have available to you. This is typically a $650 to $1200 outside task and sources for same are given in the rear of this Handbook.

2)**Do it yourself.**

If you are located in a rural area with no television or very little television, chances are good you can do this yourself and meet all of the requirements of the FCC. You may not get it 100% correct the first time you try but after a try or two (which - we warn you - will include some frustrating delays while your paper work hangs in limbo at the FCC) you will. If you live in a suburban or metropolitan area and you have never done anything like this before, you are best advised to spend the money to hire it done. This is because where there is already plenty of TV service available the FCC has created a pretty complex system of allocating certain channels to certain cities. If you wish to build the station in an area where no TV stations are operating (or allocated) the chances that you will run afoul of the allocations already in place is in your favor. In an area with plenty of TV, the allocations game gets pretty complex.

Basically you have two choices when you wish to select a frequency / channel for a low power station:

1)To **discover** that a channel has already been allocated in your town (or area), but it is **not in use**. You may apply for that channel (VHF or UHF as the case may be). When you consider that something approaching 70% of **all** of the channels **allocated** have already been assigned to someone and that in built up areas (metropolitan) something approaching **96%** of all of the allocated channels are already assigned, you begin to see that you are likely to find an allocated 'channel' not in use only if you happen to be in a rural area.

2) To ask that your new low power station be granted the right to use a channel that has **not been allocated** to your town or area based upon your engineering showing (within your FCC application) that your new low power station will not:

a)Cause interference to any existing station;

b)Cause interference to any station that may later come 'on the air' on a channel allocated to your area but presently not in use.

VHF vs UHF

The FCC has established that you may build a low power television station on any channel from 2 through 69 (channels 70-83 were eliminated from the television service several years ago although some older translator stations still operate there in rural area).On channels 2 through 13 you are limited to a transmitter power of 10 watts or less except when you build a low power TV (LPTV) station on a channel that is allocated to your town but not in use (channel 2 in Denton, Texas for example). In that special circumstance you may operate with up to 100 watts of transmitter power.

On channels 14 through 69 you may operate with as much as 1,000 watts of transmitter power; whether you are on a channel allocated to your area or not. In both cases (VHF and UHF) you must establish on paper and in practice that your transmitter will not interfere with the direct viewer reception of other station signals.

Now what is the basic difference between operating on a VHF channel and a UHF channel?

1)**VHF costs less** (under the present pricing scheme of transmission equipment as much as 80% less) to install initially and to maintain.

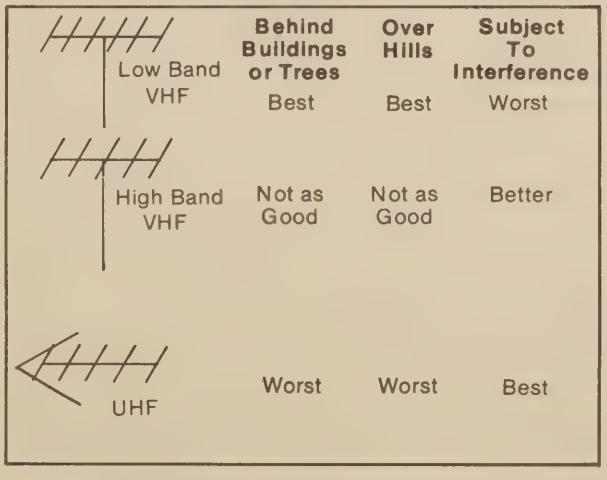
2)**UHF** is likely to have less interference.

3)**VHF** is easier to receive.

4)**UHF** is 'cleaner' to receive (i.e. better picture quality possible).

5)In rural areas you can probably find a channel for VHF **or** UHF to your liking.

6)In metropolitan areas you will find (in most cases) that if



you want to cover a **large** area (i.e. the whole city) **UHF is your only choice** but if you want to cover a small suburb or an ethnic neighborhood spanning a few dozen blocks that VHF can be used.

Of all of these considerations, the cost difference between VHF and UHF is perhaps the key. As the reference section to the rear of the Handbook shows, there are not many established low power hardware suppliers in the field. A high percentage of the UHF systems sold (as UHF translators) have been purchased by broadcasting stations, or community groups endowed with substantial funds. VHF systems have remained for the 'poor' or do-it-yourself groups. In the present marketplace we judge **most** VHF systems to be fairly priced (not all of them are this way but by shopping around you will find who is and is not) and the UHF systems to be 2 to 5 times (i.e. 200-500%) **over**-priced. We don't expect this situation to last since with thousands of new applicants for low power TV pouring their paperwork into the FCC marketplace forces should develop very quickly. This will bring newer firms with newer products into the marketplace and we expect UHF prices in particular to drop rapidly. Still, **today**, with the handful of firms in the field the equipment pricing remains very high. The only possible rationale for this is that so few UHF units are being sold these day that each is virtually hand built to order. This may not actually be the case but we prefer to give the present manufacturers some benefit of doubt as well as the opportunity to change their ways!

In a phrase, UHF equipment pricing (this includes UHF transmitters **and** UHF antennas) are a rip off at the present time. No qualifications to that statement at all. VHF equipment is fairly priced provided you shop around and select equipment which suits your needs.

The Difference - A Translator Or A Transmitter?

Remember that a translator is a device that receives on one channel and then broadcasts on another channel after frequency converting the received **channel** to the new (output) channel. So how can you operate a translator and start off with PV and PA signals since a translator obviously never has PV or PA available?

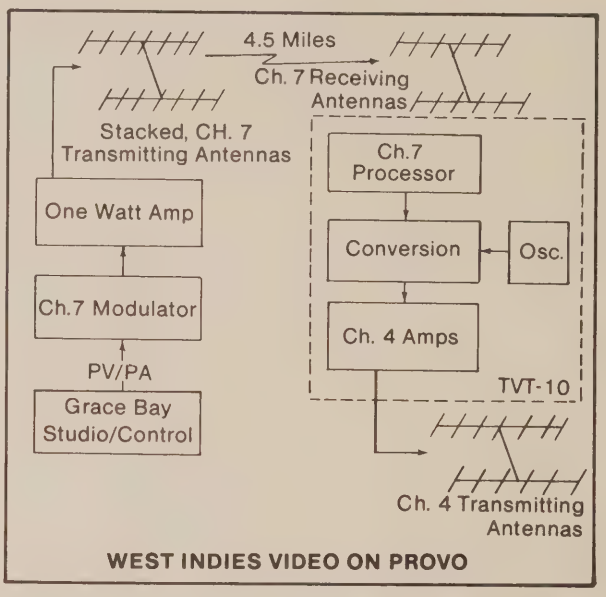
Down here in the Turks and Caicos Islands we operate a translator that **is** a transmitter. Here is how we do it and how it saves us big dollars without sacrificing any quality.

Our PV and PA signal(s), derived from satellite feeds, from local tapes, from local camera(s) and microphones and from automated equipment are all flowing through our control room. The control room could be called a PV/PA "source room" since each of the PV and PA sources originates here or passes through here on its way to the transmitter. We'll see just how that works later on.

Now **our actual transmitter** is located some 4.5 miles away from the control room. It is on top of the highest hill on our island and it operates unattended (i.e. nobody is there to operate it).

Our PV and PA signals are connected, through a device known as a 'switcher' (which selects on cue the appropriate PV and PA signal), to a box called a 'modulator'. The modulator is a cable television gadget that is really a low power transmitter. It has an oscillator that determines or creates an operating frequency (channel 7 in our case) and then it has a stage where the oscillator signal is amplified and the PV and PA signals are properly added to (modulating) the carrier wave. And it has another stage of amplification. The output of our modulator, on channel 7, is very-very low power. If you **connected** it to a channel 7 **transmitting antenna** you could perhaps carry a thousand feet or so with it and still get a picture. We on the other hand need to travel 4.5 miles so we connect the output of the channel 7 modulator to the input of a box called an 'amplifier'; an outside-of-the-modulator high power stage that develops **one watt** of power. It turns out that the one watt of power is adequate to get us 4.5 miles to our hilltop island-wide-coverage transmitter location.

Now up on the hilltop we have installed two sets of



WEST INDIES VIDEO ON PROVO

'UPLINK' ANTENNA - twin channel 7 yagis (mounted low on tower at Grace Bay) send studio signal to Blue Mountain. Other antennas on tower include off-air monitoring antenna (to check on quality of Blue Mountain signal on channel 4), two-way antenna, radiotelephone antenna. Heath digital weather station wind sensor elements are also on tower.

antennas and a solid state translator. The two sets of antennas function as follows:

1) **One set is tuned to VHF channel 7.** This set receives our control room signal after it has traveled 4.5 miles and connects that channel 7 signal to our translator. The translator is designed to receive on channel 7 and then to convert the **input channel 7** to a new channel; **4 in our case.**

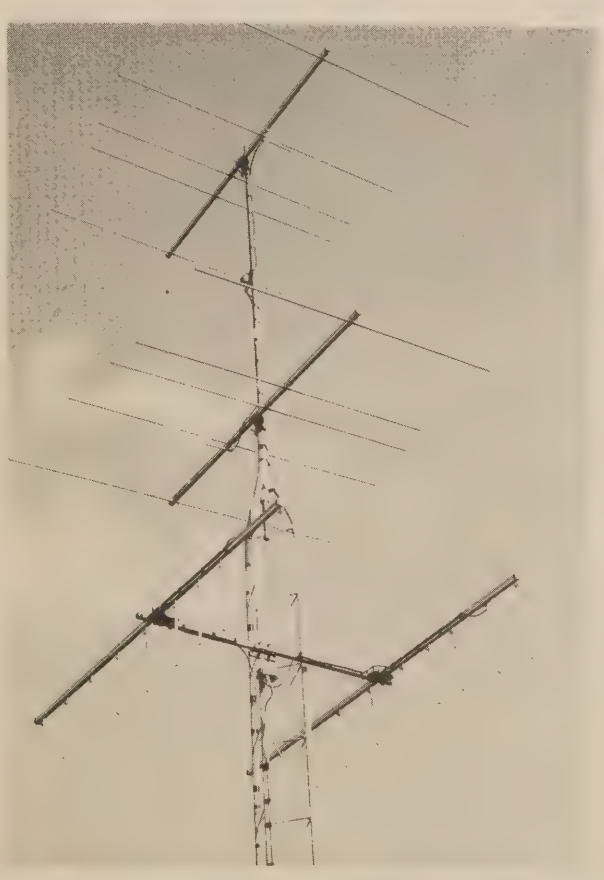
2) The second set of antennas are tuned to channel 4. The channel 4 output from the translator connects to this set of antennas which beam or focus the programs over our island.

What we have really done here is to take a standard off the shelf TV translator (cost under $2,000) and to connect to it a (CATV type) modulator (under $1,000 cost). In **our case** we have 4.5 miles **between** the modulator and the transmitter but both could be located together if that fit your situation and the output of the modulator would be directly 'cable wired' to the input to the translator.

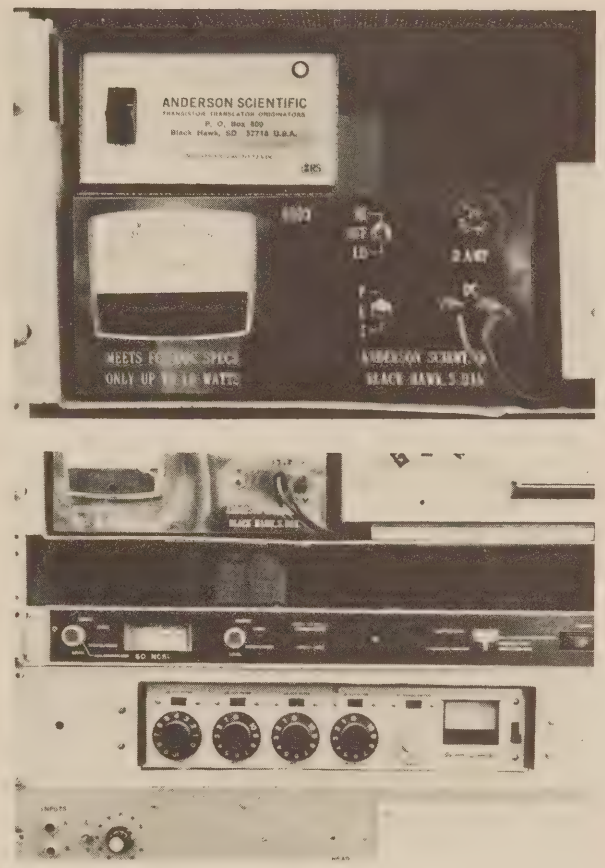
Now - what is a transmitter? How does it differ from a translator? A transmitter is a complete unit; it has jacks into which you plug PV and PA and an output connector which you connect coaxial cable so as to be able to hook to your transmitting antenna. When you put all of this into a **single package** the price usually jumps by a factor of two or more over what you would pay for simply a CATV grade modulator and a solid state ten watt translator.

The answer should be very clear. Don't buy a high priced TV transmitter just because you get pretty knobs and switches and buttons to push when you pay half as much and get the same (or better) performance in two separate units.

The bottom line? A transmitter has everything together; a modulator/translator has two separate packages (available from two different firms).



RECEIVING ANTENNA - lower set of (vertically polarized) channel 7 yagis (10 elements each) receive 1 watt signal and interconnect it on channel 7 to 7 in/4 out translator on mountain.



WIV 'UPLINK' - in this case 'up' is to our hilltop transmitter site. Blonder Tongue model TVM modulator (long, thin rack mounting unit) accepts PV and PA and turns that into a standard TV channel signal. Smaller box to left, above, is 1 watt Anderson Scientific channel 7 amplifier that boosts signal for transmission to translator some 4.5 miles away.

A Practical System

Not all potential users of the low power television service have in mind becoming miniature WCBS-TV operations. Many have much more modest goals and they are looking for **the most economical way** to accomplish these goals. Let's see how inexpensively we can do the job, what equipment is required, and where we get that equipment.

The FCC's (proposed) rules for the low power TV (LPTV) service are intentionally broad and they allow maximum flexibility for the system operator in the selection of equipment. The Commission recognizes that if the LPTV service is to be a benefit to rural Americans (in particular) that the normal high tolerance, big buck equipment rules must be toned down or eliminated. For this reason it is possible to go in with a minimal system to get yourself on the air and then as your venture grows and prospers to upgrade in certain areas to improve your signal and 'on air look'. Initially here we'll deal with a minimal type of system which will serve you well to get

started with as few dollars invested as possible. In some situations, such as for LPTV relay of satellite fed 24 hour per day religious programming from PTL, CBN and Trinity, the system to be described would prove adequate for many years.

1)**The PV/PA signal(s)** We'll assume here that you have a source of program video and audio; that in fact that source is a satellite receive terminal. We'll further assume that you will rebroadcast the total day's programs from sign on to sign off, or 24 hours per day in the case of the PTL/CBN/Trinity programming sources.

2)We will also assume that you can cover the area you wish covered with a **10 watt VHF** (channel) transmitter system.

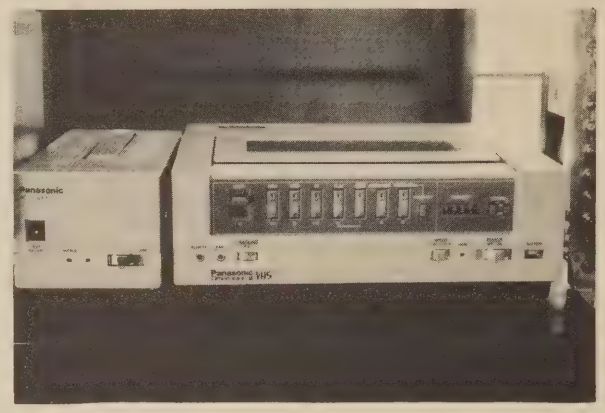
3)Finally we'll assume that you can select a transmitting location such that one or more directional (yagi) antennas can be utilized for transmission purposes.

Now let's put the system together.

Our PV and PA signals, delivered to the station, come from a satellite receiver. Such receivers produce (typically) one volt of video output and an audio signal that is directly compatible with a TV modulator. That means that you can plug the output baseband signals from the satellite TV receiver **directly into a modulator.**

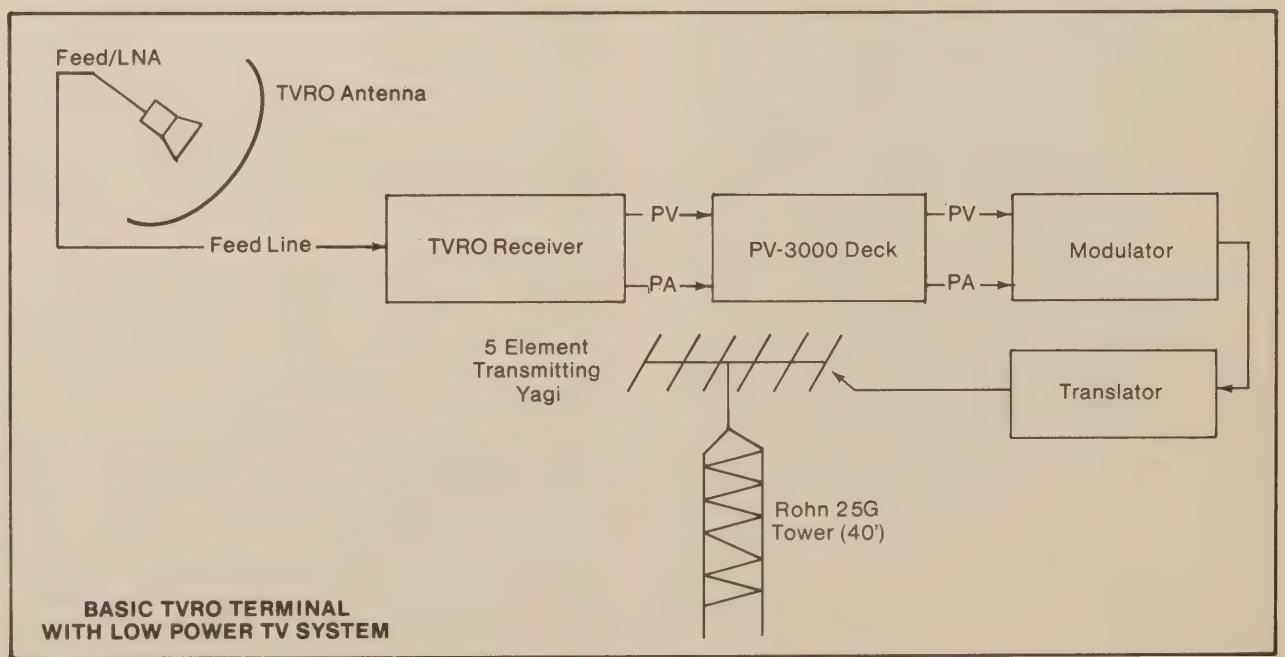
For a modulator let's select a dual purpose gadget; a VHS type tape machine, Panasonic PV-3000. If you plug the satellite video into the video input jack on the PV-3000, and the audio from the satellite into the **audio input jack** on the PV-3000, you are now applying program audio and video **to the modulator built into the tape deck.** Now if you will connect the RF output (channel 3 or 4 can be switch selected on the PV-3000) from the tape deck into an Anderson Scientific model TVT-10 solid state translator (set up for either channel 3 or 4 **input**) you have a means of using the tape deck modulator as a signal source for your translator-transmitter.

The Output of the TVT-10 is now connected via 75 ohm aluminum jacketed coaxial cable to an antenna array. Since this is a 'simple' system we will use one Jerrold 'J' Series 75 ohm yagi antenna for transmission and we'll support it on a Rohn model 25G tower 40 feet in height. **The system is shown here in diagram form.**



PANASONIC PV-3000 machine can function as taped program source and modulator in certain applications.

Now it turns out that the selection of a Panasonic PV-3000 tape deck, as our modulator source, imposes both a limitation and additional flexibility to the system. The limitation is that the RF output on the modulator inthe PV-3000 is only readily available on VHF channels 3 or 4. This pretty well restricts you in the selection of an output channel for your station to a high band VHF (7 through 13) channel since the TVT-10 **translator** does not readily convert one low band channel (any channel from **2 through 6**) to another low band channel; **only to a high band channel.** If your output channel is (or must be) on a low band channel, you will substitute here a high band modulator (to drive with your PV and PA) from a firm such as Blonder Tongue (model TVM; stock number 4930).In that way you can create 'intelligence' on a high band channel, converting it then to the appropriate output channel (on low band) with the TVT-10 translator. It turns out that the TVM modulator (a quality unit; others priced lower are available but we suggest you **not buy a 'bargain'** here since the bargain modulator may do undesirable things to your picture quality)



BASIC TVRO TERMINAL WITH LOW POWER TV SYSTEM

will cost you about the same or a tad less than the PV-3000 tape deck. So why use the tape deck?

If you have a tape deck in line between your PV/PA and your translator, you then have the ability to load a pre-recorded tape into the VHS machine (something you have done locally or acquired through program source channels) and "switch away" from the satellite feed for the duration of the taped program. Assume you may wish to televise a local church gathering for example. Using commonly available consumer camera equipment and another tape deck, you can record the program on a VHS machine. Then bring the tape to the 'station' and at the appropriate time simply insert it into your 'modulating PV-3000' and turn it on. The internal circuits in the PV-3000 will automatically 'switch' you away from the satellite feed and to the tape program. To return to the satellite feed you simply stop the tape. **This eliminates** external **switching** equipment, which as we shall later see adds up to additional dollars and system complexity.

Now the costs of this bare-bones system:

1)**PV-3000 VHS** tape deck with PVA-30 117/12 volt power supply - between $900 and $1100 in most areas.

2)**Anderson Scientific** Model TVT-10 solid state translator with 12 volt DC power supply - $1950 (price fluctuating slightly at press time).

3)**Jerrold J** series MATV yagi antenna, five element low band or ten element high band - $75.

4)**Four sections** of Rohn 25G tower including side-of-house mount, top section, five foot top of tower mast and fold-over base plate for tower - $205 (price may vary 10-15% in some areas).

5)**80 feet** of .412 aluminum jacketed 75 ohm transmission cable with 412-BFF connectors on both ends and pigtail 10 foot lengths of RG-59/U cable and F fittings on both ends for connection - $60 (price may vary 10-15% in some areas).

Less the satellite terminal we have a total materials cost of $3290. The total time to put the whole station on the air should not exceed 8 man hours for a first timer. If you live in an area where a 12 foot Vidiark Spherical TVRO antenna will deliver high quality satellite signals you can package the following satellite terminal to go with the $3290 ten watt transmitter system package:

1)Vidiark 12 foot antenna with feed - $785

2)120 degree K LNA - $750

3)24 channel tuneable TVRO receiver - $1050

4)100 feet of ½ inch transmission line plus connectors - $150

5)Four yards of concrete, commercially mixed and delivered - $180 (varies in different areas)

This now gives us a total investment for the satellite portion of the system of $2915. And a total **system cost** of **$6265.** Now, what can you do with it?

10 Watt VHF System Planning

Remember that all VHF (and UHF) signals must have something called 'line of sight' transmission paths, from the transmitter to the receiver, to be received reliably and clearly. There is no substitute for getting your transmitting antenna 'up in the air' to gain a clear line of sight to the area you wish to serve. There are three common ways to accomplis this:

1)**Build** a tall tower

2)**Locate** the transmitter site on a **tall building.**

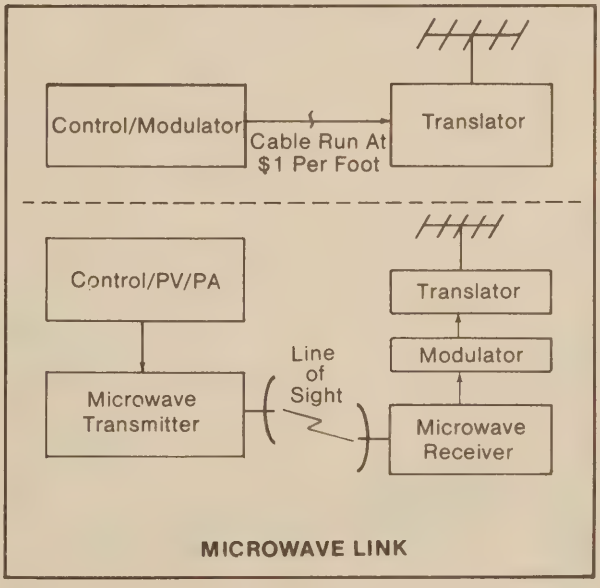
3)**Locate** the transmitter site on a **hill or mountain.**

The ideal situation is to have the control room (where the PV and PA signals are created or collected or processed) **and** the transmitter close together. Remember that you have to **connect** the PV and PA signals to a modulator and then the modulator must be **connected** to the translator-transmitter. Ideally they are all together in the same room. Of all of the elements involved, the satellite receiving terminal may be the most difficult to accomodate in this situation since the satellite antenna requires a fair amount of space.

In the United States you do not have the option of doing what West Indies Video does in the Turks and Caicos Islands; i.e. using one VHF channel as a relay to move the PV/PA from the control room site to a **distant** translator-transmitter site. That leaves you in a position where you must either 'hard wire' (i.e. run cable) between the PV/PA or modulator and the translator, or move up several financial steps and build into the cost of the system a microwave relay system. Let's look at the 'hard wiring' first.

If you select a CATV style modulator (i.e. Blonder Tongue model TVM or equivalent), it has sufficient output power to send your modulated PV and PA signals through several thousand feet of .412 aluminum jacketed 75 ohm cable; still reaching your translator with sufficient signal power to make the translator work properly. This means that you could be on the ground floor of a tall building with your control equipment (with the statellite antenna outside in the yard or on a parking lot) and then string .412 cable through the building to the translator transmitter and transmitting antenna on the roof. Or you could have your translator transmitter on top of a hill and several thousand feet below in the valley have the satellite receiving terminal and the control functions.

You probably **cannot** string interconnecting .412 (or any other kind) of cable **down public streets** or throughways (or across same) without a lot of permits and municipal hassle; so if you have that thought in mind look into what your local authorities say before you get all excited about that possibility. Even with the permits you will still have to acquire the legal right to connect or suspend your cable on the existing power or telephone or joint use utility poles. If you think of going in this direction plan on spending around **$1 a foot** between your studio and the ultimate translator-transmitter location to install the cabled section; plus around $6 per utility pole connected to **per year** in rental fees.



At some point in time you may find your particular situation requires that you get your PV and PA signals from your studio / control facility to a distant point where the translator-transmitter is located. This will be an expensive step.

Microwave Associates (M/A COM; 63 Third Avenue, Burlington, MA 01803 - Attention J. Duke Brown) is one of the better suppliers in the STL (studio to transmitter link microwave) field. There you will find that the FCC does allow you, as an operator of an LPTV station, to utilize microwave relay frequencies assigned to 'regular' broadcast

stations. You will also find that it will cost you upwards of $10,000 to get from your studio to your (remote) translator-transmitter site via a microwave relay system. The upwards could increase the cost by 2 or 3 times in an extremely difficult situation.

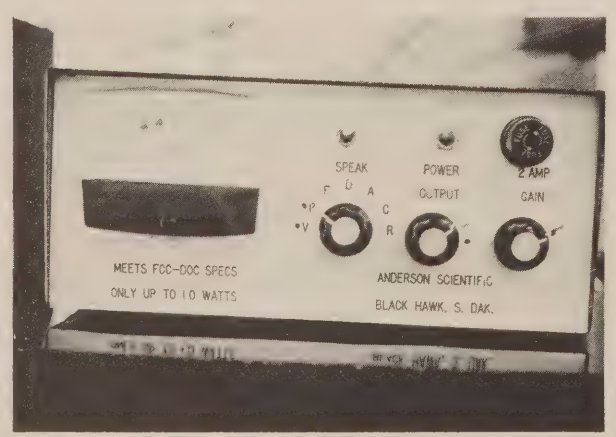
The common sense approach then is to spend plenty of time carefully selecting a site; know what your limitations are and be prepared to make the best of what you can afford to do.

It turns out that ten watts of power at VHF (or 100 watts at UHF) can cover a rather substantial area. And with the usè of directional (yagi) transmitting antennas it is possible to 'tailor' the coverage area to suit your needs.

1) **First** - determine from your proposed transmitting site just where the people live that you wish to reach with your transmissions. The easiest problem is shown here. The transmitter is located at 'one end' of where the people are and you select a simple directional yagi antenna to 'focus' your transmission energy in that one direction. If your people live in two directions, you use a pair of transmitting antennas connected to the translator-transmitter transmission line with a 'two-way hybrid splitter'; device that **evenly** balances the power available to each of the antennas. If the people live in three directions, you select a three way splitter and if in all four directions four antennas and a four way splitter.

2) **Determine how far** you **really** wish to transmit. There is a danger here. Actually a pair of dangers. The 'power' of television is awesome. It is especially awesome when television is being first introduced into an area (there are still some!) where television has not been before). Everyone knows how filthy rich people who own television stations have become in the US. It is no longer unusual for a VHF television station in the US to change hands for upwards of $50,000,000 (count the zeros). The same station that commands that type of price has probably no more than 5,000,000 dollars in **real** equipment and half of that was bought to avoid taxes; not because they needed it. Furthermore that same station returns around 35-40% profits on every dollar taken in, year after year. (That is why the price is so high.) Yes - you want a piece of that action and you figure the more people you reach the more filthy rich **you will one day become!**

Now the dangers. Ten watts at VHF and 100 watts of UHF won't go **that far** anyhow. No matter how high you place the transmitting antenna. Not on a VHF or UHF channel anyhow. It is far better to be **realistic** about the coverage area you want to serve and to design your system so that your local Market gets a **good** signal than to set out to conquer the world giving both the local and 'distant' market a poor signal. Yes - you can get 'too high' for the (local) market and actually 'overshoot' it totally! So you want to get your antenna up where it can 'see' perhaps 10 to 12 miles (maximum) in the required directions before the line of sight runs into buildings, hills, or the natural curve of the (flat) earth. Remember how a gallon of water spreads out to fill the bottom of a bathtub? If you make your 'bathtub' too big the 'depth' of the water (your signal) will be so thin that nobody can get wet!



10 WATT VHF TRANSLATOR - Anderson Scientific 10 watt unit is all 'solid state' and smaller than a shoe box. Small size and low current drain adds up to cost effective installation and operation.

The second danger is that by getting too ambitious you will not only diminish your own signal in your local area but you will (1) start causing interference to other areas (that will bring the FCC down on you), and, (2) you'll find other co-channel services interfering with you, even in your own coverage area.

Having listed those two warnings let's see what height will do for you. First select your proposed transmitter site and spend a few hours there with binoculars and a good topographical map of your area (available from any large stationary story; USGS 7.5 minute series topo map). Carefully survey, visually, the intended transmission directions and on your topo map mark off those areas where you have good visual sight. From this you will be able to pinpoint those areas where service will be blocked by something in the way. If there are substantial areas involved, with pretty good concentrations of potential audience, go into those areas and sight backwards; towards the intended transmitter site. You may find that you have a shot into the area afterall by simply being close enough to the indicated blocked areas to see through the entanglements. If your transmission antenna will be higher than your binocular siting location you'll have to figure what the additional height will buy you. There is a formula for determining just how far you can see (towards a 'flat' horizon) from various heights above ground. It is:

$$D\ (\text{Miles}) = 1.415\sqrt{H\ (\text{ft})} \quad (*)$$

Very few areas have a flat **earth.** There are hills and other obstacles in the way so television broadcasters use a modified approach to figuring coverage; they 'average the terrain'

---

* - The formula given strictly speaking determines the distance to the 'radio horizon' for a system that has an elevated transmitting antenna and a receiving antenna **at ground level**. To compute your line of sight for a flat earth (over an earth with no obstructions) take the height of the transmitting antenna above ground and compute following the formula (square root of the height in feet multiplied by 1.415). Repeat for the receiving antenna. Now add together the two answers and that determines the total distance from a transmitting antenna of D_1 height to a receiving antenna of D_2 height. When the terrain is **not flat** use a topographical map to find the height of the ground (above sea level) at both ends. Then calculate the difference. For example, if the transmitting antenna ground height is 1200 feet (MSL) and the receiving antenna ground height is 1100 feet the difference is 100 feet. For purposes of determining line of sight the difference is added to the transmitting tower height. For example, difference of 100 feet plus tower height of 200 feet equals total height of 300 feet. The square root of 300 feet is then multiplied times 1.415 to find the line of sight range from the transmitter to a receiver 1100 feet MSL. Then repeat for the receiver using just the antenna tower height (such as 30 feet), and sum (add together) the two distances. If the two distances added together is greater than the real point to point distance (as measured on a topographical map) and there are no obstructions between the two points higher than the line of sight (as drawn on a scaled vertical profile) then you have line of sight between the two points.

heights in the desired directions and arrive at something called 'HAAT' or **height above average terrain.** Fortunately for LPTV applicants there is no formal (FCC) need to mess with this type of calculation. Still, it is good to know that there are techniques for determining just what you can expect.

Let's look at this from the LPTV applicant's point of view. You have a hill in the way of an area you would like to cover. Will the hill stop the transmission? No, **not entirely.** What it will do is 'attenuate' or weaken the transmission. The key question is how much will it reduce your signal.

Here are some practical results:

1)**Within 1 to 4 miles** the signal will be attenuated by 50 to 75% on the opposite side of the hill provided the hill is no more than twice the height of your transmitting antenna (above your 'average terrain').

2)**Within 4 and 8** miles the signal will be attenuated by 60 to 85% on the opposite side of the hill provided the hill is no more than twice the height of your transmitting antenna (above average terrain).

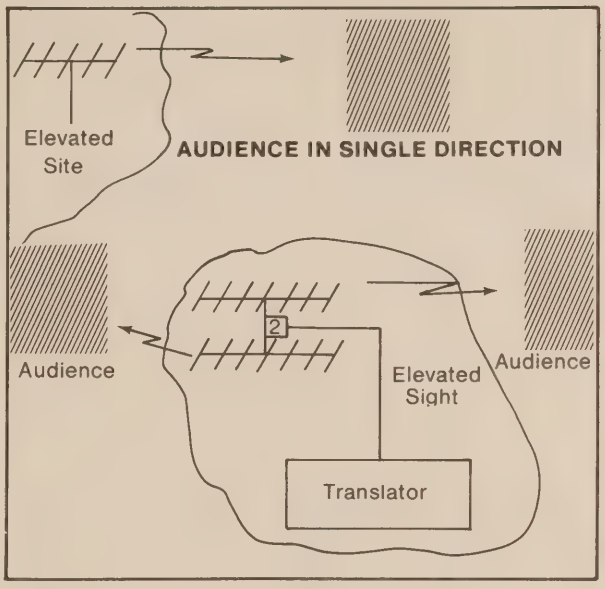
More practical results. If you are operating on low band VHF (channels 2 through 6) your 'over the hill' signal will be broadly attenuated; that is, there will not be sharp differences in signal level as you move around on the far side of the hill. If you are operating on high band VHF (channels 7 through 13) you will find 'splotches' of signal; one area a few yards across will have a decent signal, another nearby area will have greatly reduced signal level. Finally, if you are operating on UHF the spotty nature of the beyond-the-hill coverage will be even more accentuated; some people will get such good pictures you'll swear the hill is not even there. Others (perhaps next door) will get nothing at all, try as they might.

And...a low band VHF signal will penetrate trees and buildings better than a hig band VHF signal; while a high band will penetrate better than a UHF signal (at translator power levels; at high power the UHF may perform best in a big city but signal ghosting will be more pronounced at UHF as well). However, man made interference from electrical motors, automobile ignition systems, neon signs and the like will be far worse at low band VHF than at high band while UHF will be least affected by man made interference.

This suggests that given a choice **high band VHF is probably the best choice** for most areas except where the land is very lightly populated; then low band VHF may be the best choice.

Increasing Signal Density

Remember our bathtub filled with water once again. The FCC allows you to operate with ten watts of transmitter power. They also allow you to customize your transmitting antenna system so that you can maximize your signal into the area where your potential viewers are located. It will pay you

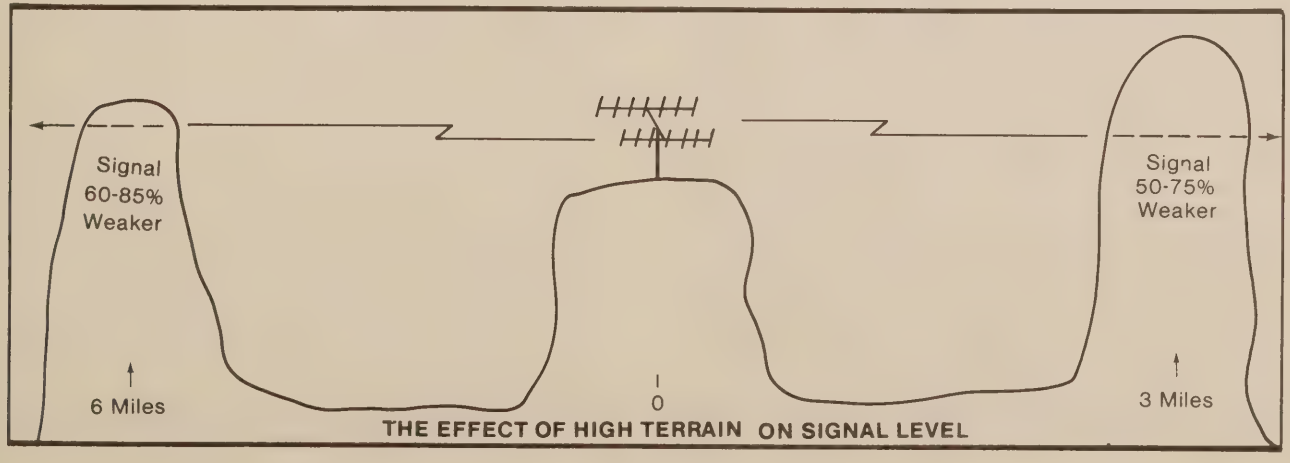


to carefully consider how by utilizing a larger transmitting antenna system (larger is not necessarily taller) you can focus more of the ten watts into a narrow area. To accomplish this you employ multiple (identical in model and type) antennas (typically yagi antennas because they inherently have directional characteristics) and you 'phase' or connect them together in a manner which narrows the 'focused beamwidth' of the transmitted signal. For example:

1)**If you phase** (also called stacking) two antennas one above the other, this is called a 'vertical array'. It means the antennas are fitted together along a vertical line. This results in an increase in your transmitter 'radiated power' by 3 dB. Now what does that mean?

'**Radiated power**' is the actual power placed into the air by the antenna system. It is the **product of** your transmitter **output power**...less any loss in power while the signal is traveling between the transmitter output connector and the input connector to the antenna array (**all cable has some loss**; good cable has less loss)...**times** the 'gain' of your **directional transmitting antenna**. Remember that antenna gain occurs only because of the directional **focusing power** of the antenna system. The effective radiated power (known as **ERP** in the trade) is the net result.

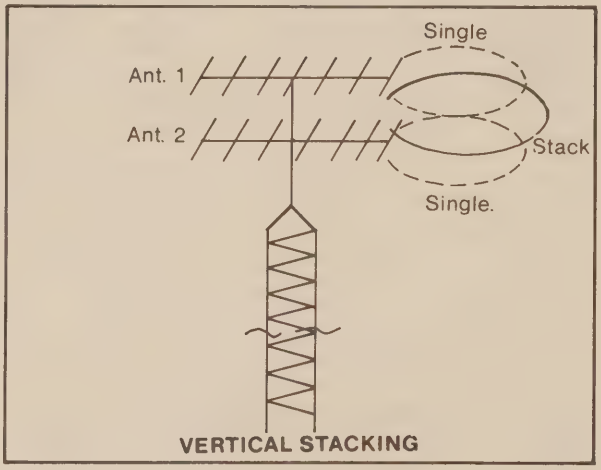
1)A ten watt transmitter



THE EFFECT OF HIGH TERRAIN ON SIGNAL LEVEL

2)Loses two watts of power in the transmission line to the antenna (net power to antenna is 8 watts)
3)Is radiated by a transmitting antenna with 10 dB of (directional) gain.
4)The ERP is **10 dB more than 8 watts** which works out to 80 watts.

That 80 watt signal is in the most favored direction. Now if we add a second yagi antenna, following good engineering practice, to the first one we can expect to realize 13 dB of antenna gain (rather than 10). Now our ERP is 3 dB more than 80 watts; or 160 watts.



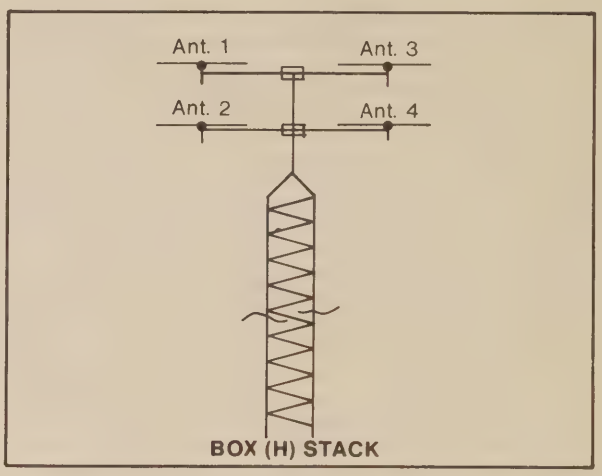
VERTICAL STACKING

If your eyes are lighting up at the prospect of building up your transmitted ERP **even more** by adding even more antennas, hold on just a minute. Remember first of all that each time you add antennas you are re-defining **the focused area** where the signal is concentrated. It is possible to define it so closely that you actually miss important parts of your intended coverage area. With that warning, let's see what does happen.

Two (identical) antennas, stacked one above the other at the proper (defined in the antenna manufacturer's literature) distance apart will narrow up the forward radiation pattern in the vertical or up and down plane. This is usually good since signal that leaves the antenna **headed upward** is wasted in space and that which leaves the antenna headed downward is wasted on the ground within a mile or two of the antenna proper. People living that close don't need any extra signal as a rule; the 'water' is pretty deep in their bathtub already. So a 10 dB 'gain' five element yagi, which is a good building block on low band VHF, might as well be a **pair** of such antennas 'stacked vertically'. You have far more to gain than to lose; provided your potential viewers are in the single direction.

The next step is not three but four antennas. Yes, you **could** stack three if you wished but it is more complicated to pull off electrically. So one of the more popular configurations for **four antennas** is shown here; it is called an 'H' or 'box' array. It amounts to a pair of vertical stacks; side by side. Now one of the rules that apply to antenna gain is this one:

"Each time you DOUBLE the SIZE of the antenna array, you gain 3 dB in antenna gain". That simply means that if **one** antenna has 10 dB of gain, **two** antennas will have 10 plus 3 or 13 dB of gain. Double in this case is a 3 dB 'improvement'; not double the dB gain of a single antenna. So if it takes **two** antennas to create 13 dB of gain...it takes **four antennas** to create 16 dB of gain. And **eight antennas** to create 19 dB of gain and **sixteen antennas** to create 22 dB of gain...and so on. Don't forget the increase focusing effect of larger and larger antenna arrays.



BOX (H) STACK

Now let's go back to our 10 watt transmitter that delivers a mighty 8 watts to the antenna array:

1)**One** 10 dB gain yagi results in **80 watts ERP**
2)**Two** 10 dB gain yagis results in **160 watts ERP**
3)**Four** 10 dB gain yagis results in **320 watts ERP**
4)**Eight** 10 dB gain yagis results in **640 watts ERP**
5)**Sixteen** 10 dB gain yagis results in **1280 watts ERP.**

There is one more comparison worth noting. Let's zero in on the four stack array with 320 watts ERP. Since we started out with 8 watts delivered to the antenna array, how much power would we have to delivery to a **single** 10 dB gain yagi to have the **same approximate ERP** as we have with the four stack array? **The answer is 32 watts.** Or if you are a glutten for punishment, the sixteen stack array would produce the same ERP and therefore the same signal at a distant point as a transmitter delivering 128 watts to a **single** 10 dB gain yagi.

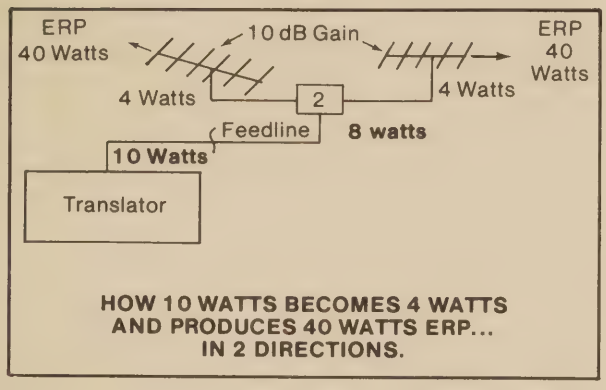
There is a message through all of this. **The FCC does not restrict you to antenna gain** in this service. Common sense, dictated by the physical size of the array plus your desire to cover or reach people spread over the countryside, determines just how carried away you get. A ten watt transmitter can amount to far more than that **if** you are willing to go that extra mile with the design and fabrication of the transmitting antenna array.

When You Shoot In Multiple Directions

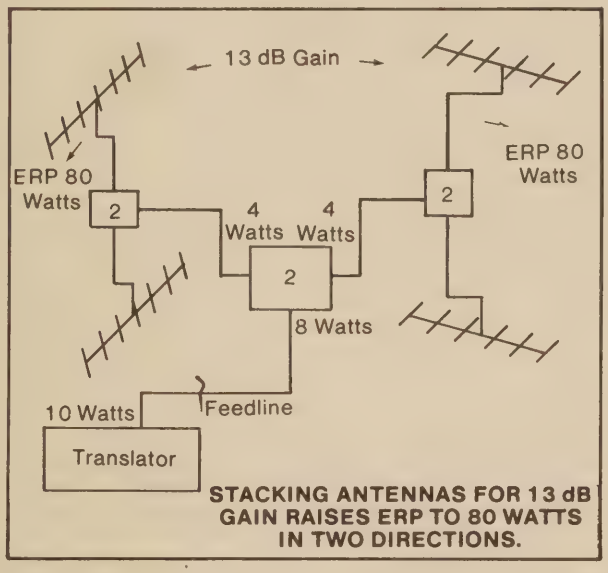
Having determined that two antennas can increase the ERP in a single direction, now let's see what happens if we wish to use the basic five element (10 dB gain) yagi antennas to cover two or more specific directions.

The premise established earlier still holds. Our ten watt transmitter manages to deliver 8 watts to our antenna system; after transmission line 'losses'. But we now have to cover not one prime direction but two. There is a standard way to do this, and a clever way.

1)**Our 8 watt signal** is brought to the antenna array in a single transmission line. But - at the antenna array we have two separate antennas to hook up. To do this we connect the transmission line into a device called a hybrid signal splitter. It separates the 8 watts into two equal outputs; **4 watts each**. Then through interconnecting cables that 4 watts is sent to each of the two antennas individually. Since each antenna has 10 dB of gain our ERP for each antenna is **10 dB above 4 watts or 40 watts**. It is no coincidence that that 40 watts is equal to half of the 80 watts; now we are sending **40 watts** (ERP) in **two directions** rather than **80 watts** (ERP) in **one direction.**
2)**Now suppose you would like to get back to the 80 watt ERP level in both** of the directions again. If you treat



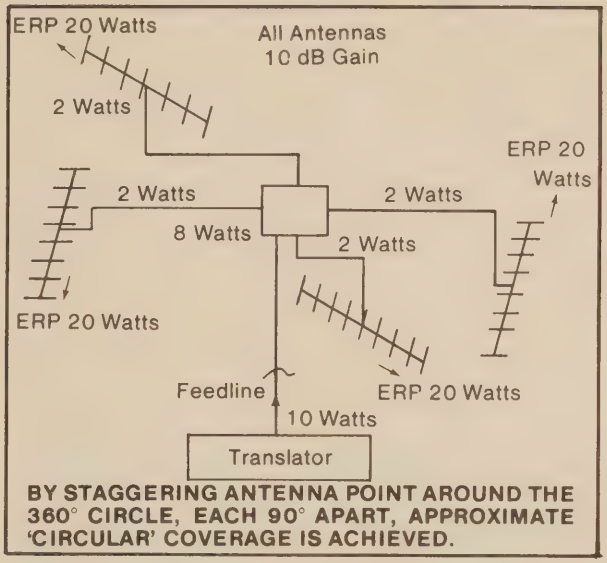
HOW 10 WATTS BECOMES 4 WATTS AND PRODUCES 40 WATTS ERP... IN 2 DIRECTIONS.



STACKING ANTENNAS FOR 13 dB GAIN RAISES ERP TO 80 WATTS IN TWO DIRECTIONS.

each of the two directions as we did the earlier vertical stack antenna situation you can have two stacks of yagis pointing in one direction (13 dB of gain) and two stacks in the other direction (13 dB of gain). Now we send our 8 watts into a splitter and create a pair of 4 watt signals, then we connect that 4 watts to a pair of yagis themselves connected through another two-way splitter that in turn connects to the two antennas. With 4 watts going to a pair of antennas we have our 13 dB of antenna gain back again, an the ERP in that direction is now back to **80 watts**. And it is the same in the opposite direction as well.

Now suppose you want to do the same thing, but you want 80 watts ERP in **four** directions? Well, first we split the 8 watt power level at the end of the transmission line into 4 equal parts utilizing a four way hybrid splitter. That gives us 2 watts at each of the outputs of that splitter. Now if we connected that 2 watts to four separate 10 dB gain yagis, we would have an ERP of 10 dB above 2 watts or 20 watts in each of the four directions. Once again it is no coincidence that the total of 20 + 20 + 20+20 =80 watts. But if your goal is 80 watts in each of four directions, we'll have to gain back the missing dBs by making the transmitting antenna arrays larger for each of the four directions. To get back to 80 watts ERP in those **four** directions will require that we increase each direction's antenna to a four stack array (16 dB gain). Yes - that takes a total of 16 antennas (four in each of four directions) but when we get done we'll have something approaching a 'circular' coverage pattern (well, almost circular) as the individual directions (north, east, south, west) overlap one another with



BY STAGGERING ANTENNA POINT AROUND THE 360° CIRCLE, EACH 90° APART, APPROXIMATE 'CIRCULAR' COVERAGE IS ACHIEVED.

80 watts ERP in all four directions.

There are dozens of other antenna tricks possible but they would fill a textbook. the important thing to grasp here is that the transmitting antenna array, like the parabolic dish antenna for the satellite receiving service, can be so configured that you can do some pretty amazing things with it. If you need something that you don't find in elementary literature like this don't hesitate to call upon a reputable antenna supplier for his advice. There was a fellow up in Canada a few years back who connected a ten watt transmitter to an antenna array made up of 64 separate yagi antennas. You should have seen the quality of his pictures 80 miles away!

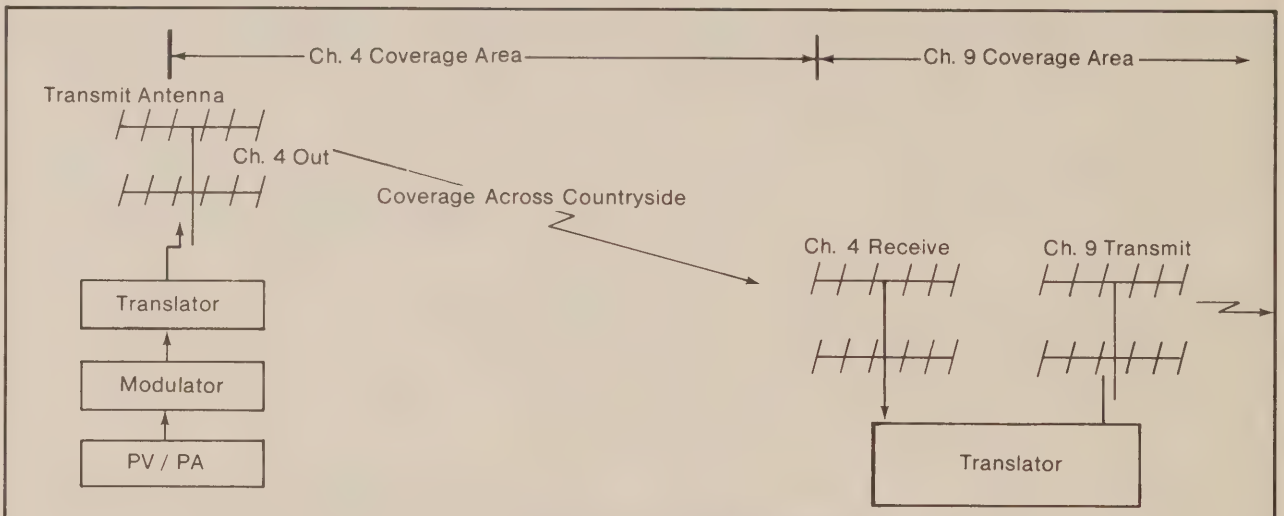
Building A Network

In the opening of this Manual we talked about the pioneering system in operation down in the Turks and Caicos Islands by author Cooper.There is at least one thing being done in the islands which may appeal to your own 'expansionist' plans. Coop is building a network, utilizing nothing but ten watt VHF transmitters. You can do almost the same thing yourself legally, in the US.

It is possible to operate two or more (VHF or UHF) translators in a 'series'; that is, a **second translator** receives the VHF channel from the **first** translator-transmitter and then **rebroadcasts** the signal on a new channel into a new area. This may then be carried to a third translator which receives the second unit and re-broadcasts it on yet another (new) channel. There are limits to how far you can carry this utilizing relatively inexpensive equipment however; a point we'll look at.

In this scenario only the first translator is designed to 'originate' or create programming; those that follow are simply 'relay' or 'repeater' stations, operating in the format which translators were initially intended for back when the FCC created them in 1960. Now when you start 'trunking' (as connecting one after the other) translators several new options are open to the system designer. In the most simple format the second translator receives the signal from number one, converts and amplifies the signal and then rebroadcasts it to a new channel. This is shown in the illustration here where channel 4 is the operating frequency of the initial unit and channel 9 is the operating channel of the second unit. Note that the low band / high band switching is taking place.

The basic rules for receiving and repeating a translator signal with a second translator are as follows:



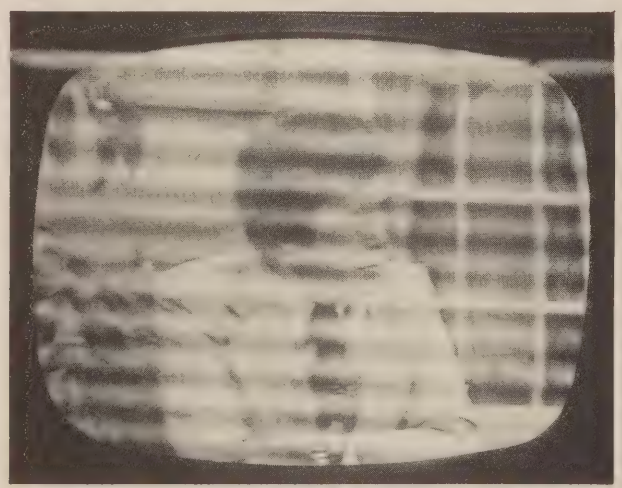
TWO TRANSLATORS IN 'SERIES'

1)**The second translator** must be so located that it receives a 'clean' signal from the first unit. 'Clean' in this instance means sufficiently strong for the second translator to not be subject to interference from other signals on the same TV channel it is receiving on or from other interference sources such as manmade noise.

2)**The second translator** must be 'line of sight' from the first unit to insure that the signal does not fade (vary in strength) wildly.

3)**Through the design** of your receiving antenna system at the second translator you must produce sufficient signal from the first translator so that the second translator has enough signal to operate properly.

Determining 'line of sight' is largely a matter of laying the projected 'path' (the route the signal will take from number one to number two) out on a topographical map to be sure that there are no tall hills, ridges or other obstacles between the two. You may find that a ridge or two will not stop you dead; remember that signal **does penetrate** beyond obstacles although it will be attenuated. Additionally, with suitable visual aids equipment (small telescope, binoculars) you may also see that you can spot the other site from the opposite end.



INTERFERENCE - when two (or more) TV station signals show up on the same channel at the same time the two signals 'beat' with one another. The stronger one is seen but the weaker one causes an overlay of horizontal and vertical lines.

If you will take a portable television receiver and a field strength meter (a device common in CATV circles that allows you to plug directly into the receiving antenna and **measure the amount of signal present**) plus a single yagi antenna to the projected site for the second translator, you can (with the first unit operating) then verify the amount of signal present. And with the portable receiver you can 'see' what interference you have at this second site. It is best to repeat this test over a period of several days, through a couple of 'weather changes' to insure that moving weather fronts are not going to cause you receiving problems. Stable high pressure areas over your region or slow moving fronts across your area tend to extend the range of all television signals and you don't want to learn **after** the installation is complete that you have selected a site for re-transmission where once or twice a week a 100 or 200 mile distant full power telvision station comes through loud and clear on your receiving channel.

As a general rule of thumb you would **like to see** around **0 dBmV** (that's the **same as** 1,000 microvolts in CATV field strength meter circles) from your final receiving antenna array coming from your first translator-transmitter. In a pinch, -10 dBmV will get you by. **Based upon extensive tests** run in the Turks and Caicos we can give you this guidance:

A)**With an ERP of 40 watts...**

1)**At a distance of 4 miles** the received signal **30 feet above ground** on a five element yagi (line of sight) will be around 0 dBmV.

2)At a distance of **8 miles** the received signal will be around -10 dBmV.

3)At a distance of **16 miles** the received signal will be around -18 dBmV.

4)At a distance of **20 miles** the signal will be around **-25 dBmV.**

In our case the visual line of sight stops at 20.5 miles for an antenna 30 feet above ground at the receiving end. This tells us that since the lowest acceptable signal level is -10 dBmV that **we have to make up 15 dB of signal someplace** if we want the repeater translator to have a proper input for quality re-transmission.

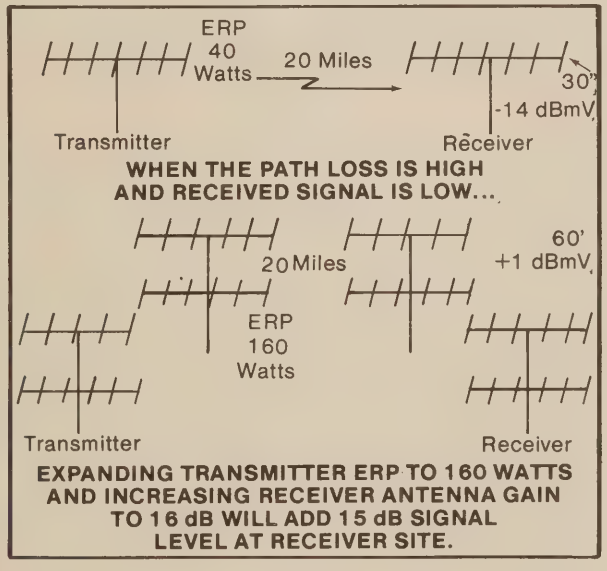
Note that our ERP in the desired direction is 40 watts; caused by our splitting the 8 watt antenna delivered signal into a pair of signals for transmission in two directions. To get the 20 mile signal back to -10 dBmV we could:

1) **Stack the transmitting array** to gain us 3 more dB. Actually we would be better off going to a four stack array in this direction (the arrays in each direction do not need to be identical as long as the antennas used within a certain directions's array are themselves identical to one another; i.e. do not mix brands and models). This then would give us an ERP of 160 watts with an antenna gain of 16 dB in our direction towards the second translator.

Now we have improved things from -25 (plus 6 more dB at the transmit end) to -19 dBmV.

2) **Stack the receiving array** to gain us additional signal. If one five element yagi produces a signal that is -25 dBmV with the **original** transmitting configuration, four antennas stacked would net us 6 additional dB.

Having increased the **transmitting** array to four antennas (**adds 6 dB**) and the **receiving** array to four antennas (**adds 6 more dB**) we now have 12 of the 15 we need to have a -10 dBmV signal level. There are two options left; stop at an input level of -13 dBmV (as designed to this point), or, raise the receiving antenna array higher. Each time you **double** the height of the array (we started at 30 feet above ground) you can expect to net **approximately** 3 dB additional received signal. So by moving the four bay array upwards from 30 feet to 60 feet we can expect to pick up 3 dB. Now in our paper model we have -10 dBmV.



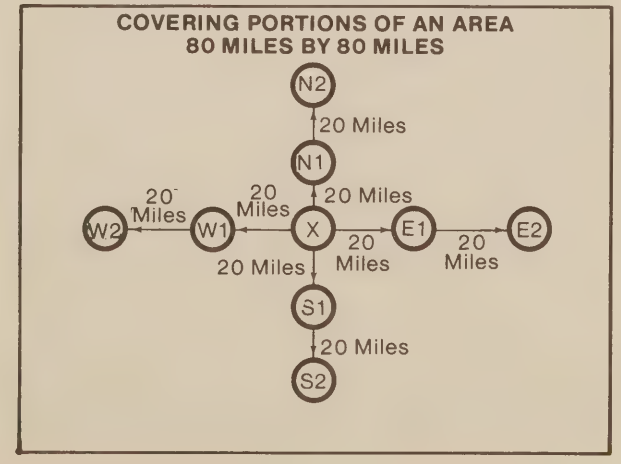
This example is a real one but it may not fit your own experience. In our example the receiving site is not elevated; the height we achieve is due to manmade support structures. In your situation you may have a tall hill, mountain or even tall buildings that you can locate on and this additional height will assist you in achieving the desired 0 dBmV or 'getting by -10 dBmV' input signal level.

There is one more thing we can do. If the received signal from the final antenna array is **at least** -15 dBmV you can installa a **single channel** signal pre-amplifier between the antenna and the input to the translator. Now signal pre-amplifiers are good devices but you should not use one unless you really need to. Why? They are electronic and electronic things fail. They mount (or should) right at the antenna and the environment is a problem. Lightning can be a problem. And if you do use one, select one that is designed for

STRAIGHT TRANSLATOR STATION - this West Indies site picks up WIV-TV from 20.2 miles away on channel 4 and rebroadcasts the signal over a new island on channel 9. Utility poles and lumber form 'tower structure'.

single channel CATV service only (CADCO, Jerrold, Q-BIT); **not one** you pick up at the local wholesale electronics house intended for **home** use.

A third translator in the 'chain' would duplicate the efforts of the second; and if you got twenty miles between the first two you can expect to get something approaching this with the third on in the line. That gives you a reach in that specific direction (if numbers two and three were in a straight line) of

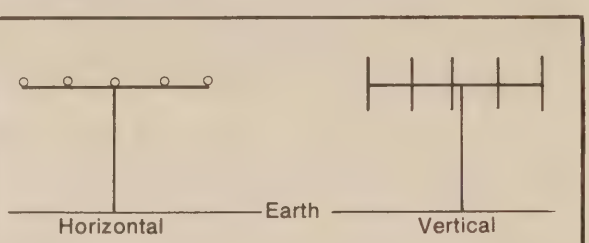


40 miles. Duplicate the same situation going the opposite direction and you now have a combined coverage area of 40 + 40 or 80 miles. **Shades of a full power TV station!**

We indicated earlier that you **cannot** keep on trunking (or trucking in the language of the day) translators forever. Actually, 'three deep' is just about the limit with most VHF and UHF translators on the market. Why is this? Well, each time a translator is inserted into the chain there is a slight imbalance or distortion added to the repeated signal. The 'sync' signals from your originating station begin to deteriorate and mild but objectionable waving lines start to appear in the picture. They **may** even be objectionable to your viewers after the second translator (although proper translator design and maintenance will minimize this). This is a solve-able problem but it takes some additional signal processing to re-clean up the deteriorated signal before sending it on again. The technology to do this is beyond this Handbook; instead we'll direct you to Dr. B. W. St. Clair of Television Technology Corporation or Keith Anderson of Anderson Scientific (see reference section).

Vertical vs Horizontal

With scant few exceptionals most all US television stations transmit a signal that is horizontally polarized; with respect to the earth's surface. All receiving antennas (set-top antennas excepted) are also horizontally mounted. The FCC translator rules do **not** prescribe that you **must** follow this format and there may be a situation or two where you would be better served by employing **vertical polarization**. That means you turn the antennas over 90 degrees so that the antenna elements are perpedicular to the earth. Now why would you do that if your viewers have their antennas turned in the horizontal direction?

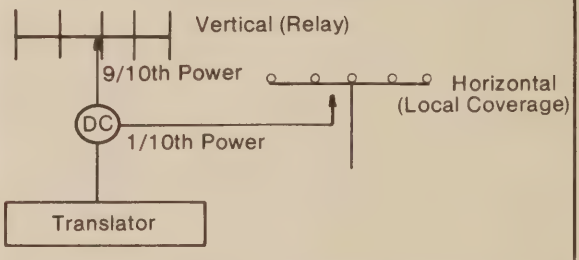


ANTENNA POLARIZATION

Suppose you have a facility where you wish to serve a few viewers in the fairly immediate area (say within 2-4 miles) but you also wish this particular facility to relay signals on to another translator that is some distance away (say 20 miles). This situation might arise when the originating station was located in a small farming community, perhaps at your ranch home, but you had a second market some 20 miles away that required its own transmitter.

There is a device called a power splitter as we have seen. Variations of this are called directional couplers. A **directional coupler** is an uneven power splitter of a sort; it can divide the available watts into uneven amounts; say 1 watt in one direction and 7 watts in another direction. If you use such a directional coupler you can connect the 1 watt output side to a five element yagi for local coverage within 0-4 miles and then connect the 7 watt leg to a more elaborate antenna array designed to transmit your signal to a repeater translator some 20 miles away.

You want the local people near the originating transmitter to get a good signal and you install the local antenna **horizontally polarized** for this service. Now - if you will install the second portion of the antenna array so that it is vertically polarized you will pretty much **eliminate interference to that signal at the receiving end** from other TV stations on the same channel. Why? Because by turning the relay system antennas vertical the normal horizontal polarized TV signals in the area on the same channel are ignored. The antenna array on both ends designs and installs the same way as previously outlined here; except the antennas are turned on their sides to reduce direct pickup of interfering signals on the channel. In this way you can get **twin service** out of a **single installation**; local service plus a dedicated (and properly engineered) relay service. The directional couplers are standard 'in-stock' CATV devices by the way from outfits such as Jerrold and Blonder Tongue. A 10 dB directional coupler would have 10 dB less signal (.8 watt versus 8 watts) at the 10 dB output port while at the normal through port it would have the remaining signal (8 watts minus .8 or 7.2 watts).



COMBINING LOCAL COVERAGE (HORIZONTAL) AND RELAY SERVICE (VERTICAL) TO ONE TRANSMITTER WITH A DIRECTIONAL COUPLER (DC).

Powering The Translator

Most VHF tranlators operate from a relatively low, DC (direct current) voltage. The Anderson Scientific TVT-10, for example, functions from a 13.8 volt 'DC supply' (this is a box that plugs into standard 117 VAC mains and creates 13.8 volts DC output) or from a 12 volt storage battery.

Now a television station (including LPTV) should be designed so that its primary power source is reliable and 'uninterruptable'. That means that you should take some precautions to insure that if your primary voltage source quits you still have operating power. The TVT-10 makes this quite simple; if you have a translator site with usually reliable 117 VAC available you take the AC/DC supply (that comes with the unit) and use it to power the translator transmitter under normal conditions. Then you can plug a heavy duty (550 amp starting current rated or marine rated) 12 volt lead-acid battery into the separate 12.6 volt DC input jacks on the TVT-10. Now when (or if) your local AC power stops your transmitter will automatically switch to the battery supply and run the 10 watt transmitter until power is restored.

Of course everything else in your system will also have to be protected with standby power. A translator operating by itself as a strict relay station has no other equipment around (except perhaps an antenna preamplifier which can also be run on the standby battery) but at the 'control studio' point you will have to back up your satellite receiver, modulator and anything else in the basic system with standby power.

In the case of the PV-3000 combination tape deck and modulator used in our first example, it accepts 12 volts as a **normal** operating voltage. A CATV grade modulator however may not be directly powered from 12 volts and to get standby power for it you will have to install a small inverter (which converts 12 volts DC back to 117 VAC) to protect it in the event of power failure.

What we have learned about battery powering in the Turks and Caicos is this.

1)**The TVT-10 translator** transmitter will function for almost precisely 72 continuous hours on a single heavy duty auto storage battery. Three such batteries, connected in parallel, will carry the ten watt transmitter for between 10 and 11 days of continuous operation.

In our case we use solar (sun cell) power to charge a battery that is hooked to the 13.8 volt volt input on the TVT-10. That battery handles about 98% of our load in our sunny climate. Across the 12.6 volt input we float a pair of heavy duty lead acid batteries. They are checked about once per month and recharged as required. When we have a cloudy day or two the solar charged battery operates until it drops down to around 11.8 volts and then a switching network inside of the TVT-10 changes us over to the two standby batteries. They function as long as the solar charged cell is 'down'; when it comes back the unit switches back to the solar charged system.

None of this may apply to your installation. Still it is good to know that a translator site that may not be always accessible can be designed for reliable operation even if there is no commercial power available there. The cost of powering a TVT-10 as outliend here is around $200 in auto batteries (three heavy duty units), around $900 in solar cells (from Solarex Corporation) and another $50 in control/charging circuits.

Generally speaking the electricity requirements for a ten watt VHF translator are minimal. The power consumption at 12 volts is just slightly over 1 amp which makes the 117 VAC use in the .1 amp region. That says it takes 10 hours to use 1 amp or 100 hours to use the rough equivalent of a kilowatt hour. When you consider how many homes or people you might serve from such an installation for around **7.2 kilowatt hours per month** (with a 5 cent per kWh electrical rate that comes to 36 cents per month) you can quickly see that LPTV is indeed very energy efficient!

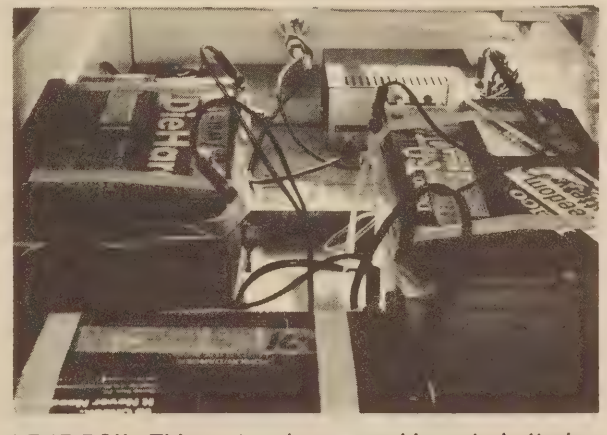
The Control System

If your system will have but a single source of PV and PA (per our early simple example which would fit rebroadcasting of a satellite delivered Christian channel) you have no need for some equipment to 'professionally' select your program video and program audio sources. Recall that we suggested utilizing a PV-3000 Panasonic VHS deck as a 'modulator' when you could design your system witha channel 3 or 4 (RF) input and then use a VHF high band (or UHF) output. Suppose you cannot do this; that you want a low band VHF output, or, that you would like the ability to insert VHS (or BETA) tapes through an external modulator.

One simple way to do this, with an outboard or separate modulator, is to simply insert the tape deck in the PV and PA lines between the satellite video and audio source and the input to the CATV grade modulator. Here is how that works.

The tape deck has an external video and external audio input jack. (On the PV-3000 the video in is an RCA jack while the audio is labeled 'Mic' and it is a miniature jack) Plug your PV and PA from the satellite receiver in here. Then locate the video out and audio out jacks on the PV-3000(or whatever tape deck you select. Run them to the video-in and audio-in jacks or terminal strips on the modulator. This places the tape deck in line with the satellite source/modulator. You can **'switch'** to a tape by **simply inserting a pre-recorded tape** in the machine and pushing the play button on the tape deck.

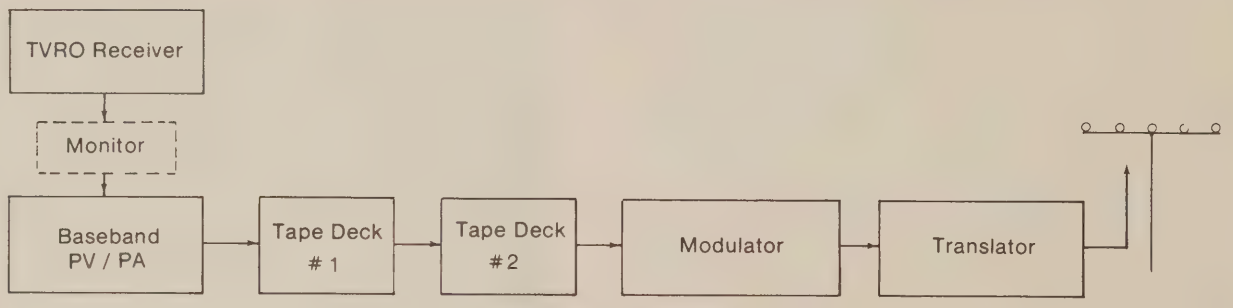
Such 'switching' is about as simple as you can get and not be totally amateur; **but it is far from professional.** For one thing you need a way to know what is on the satellite signal all of the time; so that you can switch back without cutting into the middle of a show or phrase. If you insert a video monitor with audio playback capability in the line ahead of the tape deck but after the satellite PV and PA sources you now have a 'satellite line monitor' which will allow you to 'return to network' with some degree of professionalism. But suppose your local tape runs out before you can switch back to the satellite feed (ie. your timing is off)? What do you do now?



IN THE BOX - This system is powered by auto batteries (see text). The entire transmitter and its battery power supply fits snugly into a pick-up truck metal tool box (under $100 new) which provides a weathertight enclosure and easy access for authorized personnel.

One way to handle this is to insert a second tape machine in the line; one that has in it at all times a pre-recorded test pattern (perhaps with music on the audio) tape. The tape might be color bars with superimposed announcements (ie. "We will return to CBN shortly"). In this way if the prerecorded announcement tape is always in place you can use it for a number of purposes; to 'fill' when your timing is off, to properly identify your station (the FCC requires this) with the same tape or a different pre-recorded tape, to ask your viewers to 'stand by' while you correct a technical problem, or whatever. **Now this will work**, and if you can series two tape machines in this manner you could probably series three or four and do some pretty complicated 'switching' back and forth in this manner.

This is hardly the ideal system however and since everything runs in series you can only load one set of PV and PA through the system at a time. Even 'cueing' a tape so you know what it will say when it starts to run will require a separate, not-series-connected, tape machine on premises. It should now surprise you to learn that the professionals have a better system.



LOW COST APPROACH TO INSERTING LOCAL TAPED MATERIAL TO TRANSLATOR PROGRAMMING

The key to having reasonably good in-air-production is to have a professional 'switcher'; a machine that will handle whatever number of PV and PA sources you might end up using. It works in this manner.

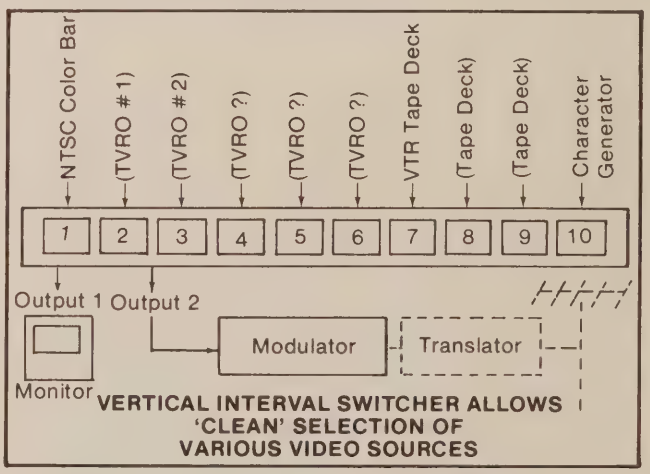
All television receivers depend upon the constant presence of something called the vertical interval signal. This is a signal transmitted within the video waveform which the television receiver uses for reference purposes to establish 'timing' for the complex video signal waveform. If the vertical interval signal goes away even for a brief instant the TV set loses its reference and the picture will roll or sway or disappear altogether. If you set out to create your own **switching box** with a panel full of double pole double throw switches (to switch audio and video together) there would be a brief fraction of a second between switch break and switch make where the vertical interval signal from your satellite feed, tape deck(s) or whatever would be missing. When you came back to the new 'make contact' the TV set would have lost its reference timing signal and the sudden reappearance of the vertical interval signal would cause the picture to roll. A glitch in the TV trade.

Professional broadcast stations use very elaborate schemes to make sure that when they switch from PV/PA "A" to PV/PA "B" they do so in a manner that is 'clean appearing' to the viewer. Fortunately for your pocketbook and mine there is a variation of this complex switching technology which is more affordable.

Vertical Interval Switchers is what this special switching box is called. One of the better buys in this area is made by 3M (their model 80-9700-0077-6); it lists in the $1,000 region and it works in this manner. With 10 separate inputs you can plug into the VIS up to 10 different PV and PA sources. The 3M unit has a pair of outputs; one will connect to your modulator and the other will connect (if you wish) to an 'on-air-monitor'. On this monitor you see the **final** video product before it goes to the transmitter. Each input has something called a 'through output' which means that the input signal into position 1 (for example) **"loops through"** the switcher and then is available for some other duty. Most often this 'some other duty' would be to connect it to a monitor so that you can see precisely what is happening on that source since the whole premise of production switching is to 'hit' the selected source at the apporpriate point in time.

With ten possible inputs to be selected you can carefully determine how best to use each one for the best possible 'on air look'. With the 3M unit noted here, by the, you have something called 'audio follow'. That means that the **audio is switched with the video** (through a companion built-in switching system). Not all switchers have **built in** audio switching available; some such as the LENCO 467 series units require a separate box for audio switching (at about 50% more money than the A/V switching of the 3M unit).

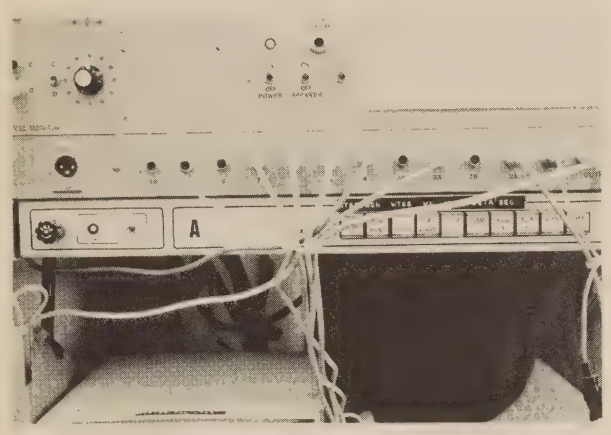
The Vertical Interval Switcher works by searching within the television field for a point where it can switch with a minimum of 'glitch'. The actual switching takes place during a portion of the television line transmission called the 'vertical interval'. This is an extremely small period of time during which no video information (only sync information) is being transmitted. When you press the button on the switcher you 'think' you get instant results. Actually the switcher received your command and then held it for a millisecond while it waited for the next vertical interval to occur. When it did occur, **then** it commanded the switch.



VERTICAL INTERVAL SWITCHER ALLOWS 'CLEAN' SELECTION OF VARIOUS VIDEO SOURCES

The ten inputs. We don't have to use them all of course, initially. We need some room to 'grow' as the station expands.

Input One - one of the handiest gadgets you can add to a station is a reasonably high quality test waveform generator. You may not realize it but a color bar (test pattern) is a test waveform. It may be sometime before you need or want to understand why this is so; for now accept it. There is a reasonably priced (under $800) machine on the market which can generate for you, at the push of a button, any of several color bar patterns, plus full color screens that are (switch selectable) red, green, blue or any variation that can be created with two or more. The same machine will generate audio test tones (1 kHz, 3 kHz) and various other important signals such as a composite video signal. This is the **BK Precision 1250 NTSC Generator.** With it you can place a high quality color bar test pattern and tone on the air



VERTICAL INTERVAL SWITCHER (long, thin unit at bottom of photo) selects appropriate PV/PA source for connection to your modulator.

LIGHT-TOUCH buttons illuminate when selected on VIS.

at anytime. As you gain experience you'll also discover you can use it for dozens of other production techniques. We'll plug it into VIS position one. It gives you some feeling of security to know that in an emergency you can always punch up "1" and see a test pattern and tone on the air.

Input Two - If you have a single satellite video receiver, this is where it will go.

Input Three - If you have a second satellite receiver, it will go here.

Inputs Four-Six... if you are in the 'big time' and have additional satellite receivers, they can go here.

Input Seven - Here you can plug in the audio and video from your first tape deck.

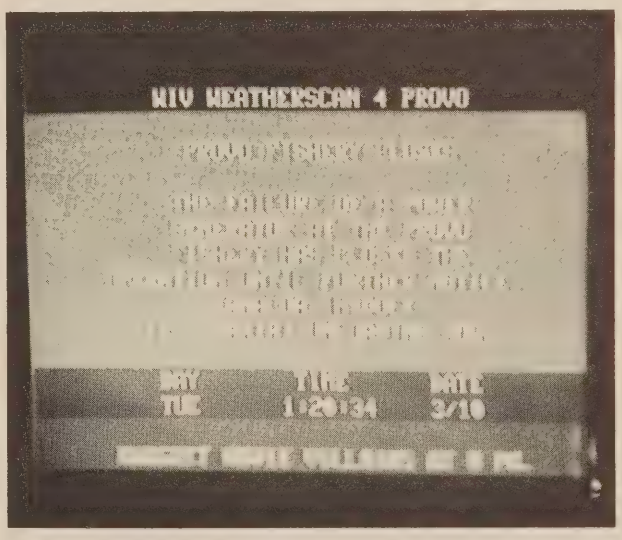
Inputs Eight and Nine...again, if you are in the big time, plug them in here.

Input Ten - We don't know how you will set up your station but in our case we plug in our 'BEI Character Generator' (model CG-800) and it has been outfitted with the Heathkit Digital Weather Computer. Lets' talk about this a minute.

Now it may well be that in your opertional plans you are going to be financially strapped, and content, to settle for nothing locally generated or created except for the tape programs discussed previously. We have found, however, that local programming is very important as is local 'viewer identification' with what you are doing. Local programming, done in the area with a portable tape deck, satisfies part of this but there is no way you can keep an image of local identity before the viewers with this type of programming unless you run and re-run it far more frequently than most viewers will care to see it.

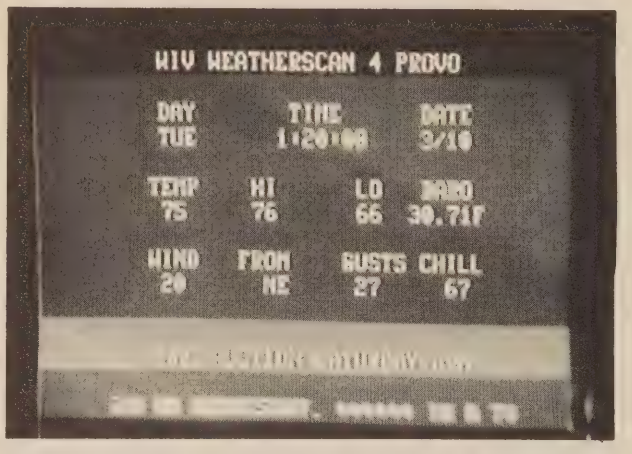
The problem is 'how do you create a local look' without tieing up tens of thousands of dollars in equipment and hiring a staff to sit around and think up programs? One way to do it, effectively and for around $4200 in real funds, is to purchase a local video system such as the BEI CG-800. It can even be made to pay for itself.

The CG-800 is a combination message channel and weather reporting machine. You can (on option) buy the number of 'pages of memory' that you feel you will need. Each page holds a finite number of characters (letters and numbers). The page format can be ordered to suit your needs; it can be messages only (which you enter a page at a time with a keyboard provided) or it can be a combination of messages and the current local weather. We opted for the BEI package that includes the Heath/Zenith IDW-4001 Weather Computer. This gives us an **automatic, unattended system** that tells viewers the current local time, date, day, temperature; the high temperature for the day and the low temperature for the day, and, the barometric pressure, the wind speed and direction and the peak wind gusts. It also tells the the 'chill factor' as well. In our version we have 16 pages of memory; one page is dedicated to the above weather information while there is a static line near the bottom that is used for important, short announcements. Then across the bottom of the screen is a 'crawl' which we use to capsulize the current and forcast weather plus to give viewers a running listing of the TV program highlights for the next day or two.



LOCAL ANNOUNCEMENTS are important in a 'market' where no local media (radio or daily newspaper) exists for your audience being served. Non-English character generators are also available (from 3M) if you are planning to serve an ethnic marketplace.

This is one of those 'program it once per day and forget it' machines. The weather changes, through the Heath/Zenith IDW-4001 are updated as they happen. You can program the machine so that it flips through the pages of memory in any sequence you wish and you can tell it to stay on a page for a second or a minute or anything in between.



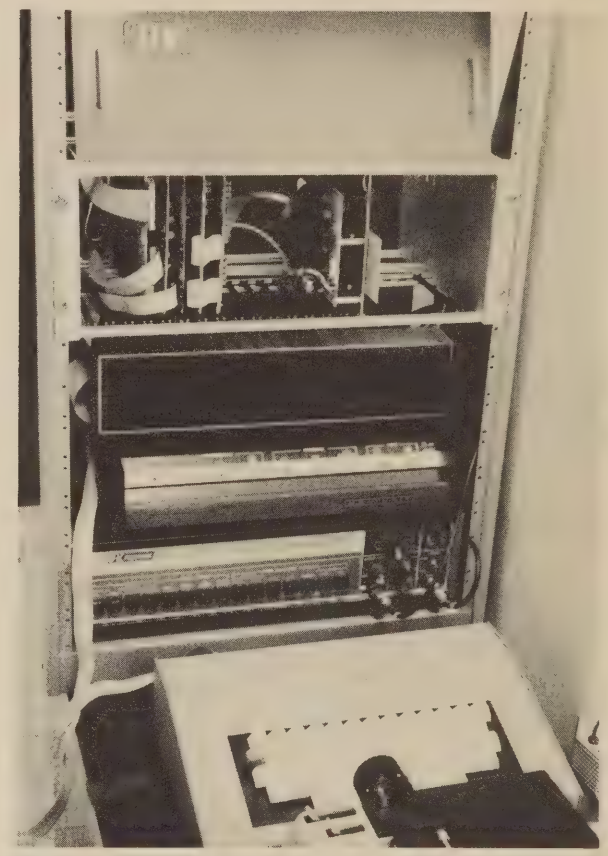
LOCAL WEATHER DISPLAY FROM West Indies Video tells viewers current and recent conditions in the Turks and Caicos Islands.

We use this machine in several ways. First of all you can 'sell' sponsorship of the weather crawl to a local merchant. $30 a month or a dollar a day is not a lot of money but it helps pay for the electricity. Next you can load the pages up with classified ads which you sell locally. A sixty or 70 word **' TV CLASSIFIED'** that runs for a day can bring in a couple of bucks and if you have thirty or forty of them you can make some pretty decent money with the machine. Then to promote public interest you should intersperse no-charge public announcements (School is Closed; City Council Meets Tonight; First Baptist Church Holding Social, etc.) with the commercial messages sold.

We add background music to the video making a complete 'program' and then every half hour when the normal programming goes into a lull for station breaks and commercialswe punch up the CG-800 and let it run until the next programming begins. In this manner we maintain a close local identity with the community being served. And we'll pay for the CG-800 with added revenues within six to seven months time. In a different market you might pay for one of your own much sooner.

If your area has no local radio or newspaper (other than perhaps a weekly) or if your area is going to be serving a specific ethnic group or religious group, the CG-800 or a machine like it can become your electronic newspaper.

There is one more reason to consider standby powering. Some of the equipment in a more complex station has electronic memories built in. The vertical interval switcher, for example, returns to a 'neutral' (i.e. no input selected) state approximately three seconds after a power cut-off. If you happen to be gone when this happens your switcher will not process PV and PA after power returns. The Channel Cue and the Heath Digital Weather Computer (**see text here**) both have 12 volt inputs which allows you to connect standby power to the two units so they keep on running even with a power failure. Without this you have to go back and re-program information into each after a power failure. The CG-800 is especially vulnerable to power outage. You spend 30 minutes to an hour 'loading' its keyboard with information. Then along comes a power outage and everything in the memory is lost; you have to re-program it again. Here the solution is to run the CG-800 through a small 12 volt DC to 117 VAC inverter, operating the inverter from a small trickle charger connected across a heavy duty auto battery. Standby power is more than a nice touch when your station grows in complexity; it becomes absolutely necessary if you are not going to end up being a slave to the day to day operation of the equipment under any and all conditions!



BEI CG-800 (cover removed, in rack below cover) plus local keyboard provides inputs to multiple pages of memory and local (weather, news) information for system.

This final advice. There is a tendency when ordering a machine such as this to put yourself into a 'box'; that is, being uncertain how much machine you really need, to order initially 'less memory' that you really need. Be sure when talking with the supplier you and he understands that you want the ability to **expand** the number of memory pages **in the future.** Understand just how many pages you can add (later) and if you can add them the field or whether it has to go back to the factory. Generally speaking additional groups of pages (in groups of 4 or 8 or 16) are not terribly expensive in the beginning but you don't want to end up with a system that cannot expand to meet your growth as your system becomes established.

Local Titling

Since we see so much television with some pretty fancey production we naturally we naturally assume (when we are new to the business) that there are magic boxes in the television business that can do just about anything. There are. But they often cost far more to acquire and maintain than you will ever be able to justify with a LPTV system. Let's explore a couple of these here so you can better understand why you won't be able to do certain things with production.

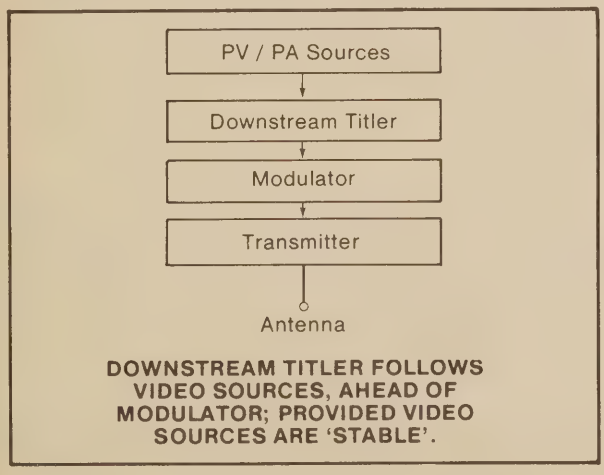
> **Titling** - Everyone puts words on the scree. It follows that it must be a fairly uncomplicated and not very expensive process. Right? **Wrong.**

Now the CG-800 and other systems that generate their own

video 'matte' (the background colors one sees in the weather/news display) can be married to letters and numbers quite easily. That's because the letters and numbers come from the same 'sync reference source' as the matte color(s). The problem arises when you wish to take somebody else's video (such as from a satellite feed or a local tape) and put letters and numbers **over** it. The call this superimposing and it means simply placing a character generated message **on top of** the video you are using and processing.

Their are a number of 'titling' machines on the market; the **Shintron 505 Video Typewriter** is shown here. **Most** of these titlers require that an external sync source be plugged into them so that the video letters and numbers they create are 'matched' or in-sync with the incoming video. When you are carrying CBN video their sync source is back in Virginia Beach. You can't very well plug into it . . .directly. There are some schemes around where you can 'steal' the sync out of their signal but they are typically expensive and beyond the scope of this Handbook. The more accepted way is to take one of two approaches:

DOWNSTREAM TITLING is possible with Shintron 505 but very stable sync from signal being 'titled/captioned' is required. You'll not be able to title unstable tapes or satellite signals at or below threshold with unit.



DOWNSTREAM TITLER FOLLOWS VIDEO SOURCES, AHEAD OF MODULATOR; PROVIDED VIDEO SOURCES ARE 'STABLE'.

Use a machine called a 'downstream titler'. The Shintron 505 is one of these. It inserts in the video line say between the output of the Vertical Interval Switcher and the input to the modulator.It sampes the sync in the signal and then attempts to match it so that the letters and numbers you type on the screen are in sync with the 'upstream' signal. Unfortunatley for the 505 (or any other downstream titler we have worked with) to provide jitter-proof titling over the video you are running through it, **the satellite** (tape, etc.) **signal has got to be very good.** It must have near perfect sync coming out of the satellite receiver and this says that signals that are at threshold or below are **not** going to work for downstream titling.

So before you invest in a downstream titler, as nifty as it may sound to be able to superimpose static or crawling messages on the video you rebroadcast, be certain that your satellite signal is sufficently clean that the downstream unit will work with it.

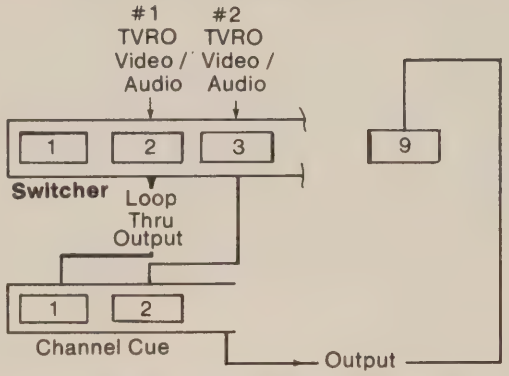
The other approach really costs some bucks. First you run the satellite/tape or whatever video through a device calleda time basecorrector/framesynchronizer. The Microtime 2520 is an example; a hefty $17,500 example at that. This clever (it should be for that price!) machine takes the picture apart a line at a time during each'frame'.Where there is some imperfection in the picture, the TBC corrects it. In the process it references to new sync which it substitutes for the incoming sync. However for the TBC to work as part of a 'system' it must be tied to a 'station sync source'; a master sync generator external to the TBC. That's probably another $2,000 or so.

Once you have done all of these amazing things you can use the TBC corrected video to mix with local station video; you can generate titles over or through the incoming (but corrected) video. You can be a big time broadcaster. But the price just to get set up is very high.

Automatic Switching Control

One of the refinements you may wish to entertain after you have your system up and running is **automatic switching between program sources**. If you are not wed to a single source (such as PTL, CBN or Trinity) and you will be doing some switching between sources it becomes necessary to 'man' the switching station.This sounds like fun in the beginning. After a short while it becomes a schedule that dictates everything else you do in life however and you figure there has got to be a better way to handle this.

Fortunately there is and it is not **that** expensive. It certainly beats going out and hiring someone to sit at the station to make switches. Once again we 'tap' the technology of the cable TV industry. **Gardiner Communications Corporation** (1980 South Post Oak Road / Suite 2040 / Houston, TX 77056) manufactures something called the **'Channel Cue'**. This is an automatic PV/PA switching system which can be married to your Vertical Interval Switcher via a single 'Channel Cue dedicated input'. Remember that the VSI 'loops' your video signal and you can loop the audio as well. You run the looped output from the switcher into the Channel Cue. The ChannelCue has a touch tone keyboard into which you enter its individual input (channel or source) identification numbers and when you want it to switch to that source. The machine will switch to a source with the accuracy of the internal solid state clock; 319 separate switching operations can be performed with one complete memory. Plus it has four character generated messages (there's your local station identification) and if you have a 12 button touch tone telephone in your home you can 'dial it up' and tell it to switch from one source to another without even entering the studio. For someplace between $1200 and $2000 you can have this magic built into your station. Oh yes, one of the interesting options available will interrogate a frequency agile (tuneable) TVRO receiver (not all; just some designs) and tell it to retune to a specific channel. In short, you can not only switch PV and PA but on time command direct your TVRO receiver to change channels



BY LOOPING VARIOUS SOURCES THROUGH SWITCHER TO 'CHANNEL CUE', YOU RETAIN MANUAL CONTROL WITH SWITCHER; AUTOMATIC 'CHANNEL CUE' CONTROL BY SWITCHING VIS TO ITS INPUT SPOT ON SWITCHER AND LEAVING!

in preparation for the **next** switch! Ah yes...technology is wonderful.

VIDEO / AUDIO LEVELS

Virtually every satellite receiver sold **claims** to have a 1 volt peak to peak (baseband) video output. Many claim to have 0 dBm audio across 600 or 150 ohms. Both of these numbers are generally regarded as 'standards' in the video and audio industries.

Now when you are connecting the satellite receiver; it may not be dead-on 1 volt / 0 dBm but it is fairly constant anyhow. This is not the case when you are switching between PV/PA sources with your VIS. Within reasonable limits (.5 **to** 1.5 volts video, -6 **to** +6 dBm audio) most VIS machines do not care too much what your levels are. BUT - the modulator that comes after the VIS does care. Most modulators have a very limited amount of automatic level compensation built into them. The Blonder Tongue TVM modulator for example has a front panel video modulation and audio modulation pair of controls on it; and a meter to set the video plus an 'over-modulation' light to set the audio. When you switch from your local test pattern (if the B&K 1250 generator you can believe **it is** 1 volt) and a satellite receiver you will probably find the modulator modulates properly with one; but not the other. In other words, as you switch from source to source you must have some method of insuring that regardless of the source selected the modulator sees pretty close to 1 volt peak to peak and 0 dBm. **If you don't?**

The video over or under modulates and the audio blasts the viewer out of the room, or, is so weak the viewer has to get up and turn up his own sound. There are two answers to this.

1)Figure out, by using the audio/visual modulation metering on your modulator, which of your sources is 'weakest' and then make up some **resistive pads** (attenuators) to reduce all others to the same approximate level. In that way when you switch you will be switching between 'equals' not dis-equals.

2)Place **external processing amplifiers** (visual and audio) in each of the video and audio lines and use their gain/attenuation controls to set everything to one volt video; 0 dBm audio (again using a B&K 1250 generator as a reference or some other suitable reference to initially set up the system).

Of the two approaches fixed, resistive pads (made up from three selected values of resistors) is the least expensive appraoch although it will require somebody with a few smarts to figure out the resistor values for you. This is a 'fix once and forget' situation provided your 'sources' stay reasonably stable. If you don't do this? You'll spend your life adjusting the video and audio modulation controls on your modulator or transmitter!

This is not intended to be a complete treatment of video production of course. Rather we hope you will, by sampling the technology, have a greater appreciation for what you **can** and **cannot do** with relatively inexpensive equipment.

There is a challenge here as well. Since the only market for video production equipment to date has been in the big-bucks broadcasting arena, there has been little incentive for more reasonably priced equipment to be developed. Everything about the 'traditional' broadcasting business is big dollars. $1,000 microphones; $100,000 tape machines... the list is endless. It takes the development of a market of some dimensions capable of paying only for less expensive equipment before more 'reasonable hardware' is developed and mass produced. It is coming; LPTV will do it, not only in the US but worldwide.

The Philosophy Of LPTV

When the FCC task force recommended low power television 'for the masses', most people yawned. It was felt that it would be attractive only to rural folks, or if in the suburbs to a handful of religious or ethnic groups. But the first ten days after the announcement saw several hundred applicants file with the FCC and between mid-fall's announcemt and mid-February more than 3,000 applications arrived at the FCC. Not all came from rural folks or Christian groups or ethnic groups. **In fact most did not.** They came from **new network** planners, asking for 100 to 150 stations each. They came from established broadcasters like Ted Turner(WTBS/CNN; 25 initial applications). They came from the **real** establishment; ABC with a half dozen applcations, NBC with ten.

They also came in at substatially more dollars than the FCC anticipated; a typical 100 watt UHF station listed upwards of $50,000 construction expense while a typical 1,000 watt UHF application expected to spend upwards of $100,000.

The FCC is plainly distrubed by all of this instant reaction. Groups with the money to put in $50,000 or $100,000 UHF 'LPTV' installations obviously have different programming purposes in mind that say the folks who want to provide Polish language television for a section of Milwaukee. Yet both come **together-even** at the FCC; both are after the **same** channel and given the resources of the network group they are odds on favorite in such 'contested' situations to win the FCC approval for the allocation.

If you go in and study the applications to date however you quickly discover that they are largely centered in the larger cities of America or the suburbs surrounding those cities. What has really developed, instantly at least, is a stampede to sew up the channels remaining **in the bigger markets**; not those that would serve the folks who still have no television available. We mention this because you may feel discouraged when you read that so many 'big outfits' have jumped into the low-power stampeded.

Virtually all of the applications to date have been for the UHF channels. The 'power advantage' (1000 watts versus 10 watts) is the primary reason for this of course. **And**, virtually all of the applications to date have been in suburban and metropolitan areas. Many of the applications are **mutally exclusive**; that means two or more applicants have filed for the same channel at the same place. The Commission has already announced that under its 'interim application processing machinery' mutually exclusive applications will be treated last of all. The procedure for considering such con-

tested applications has not yet been worked out and when it is there will be years of delay for many of these 'contests' to be considered and decided at the Commission.

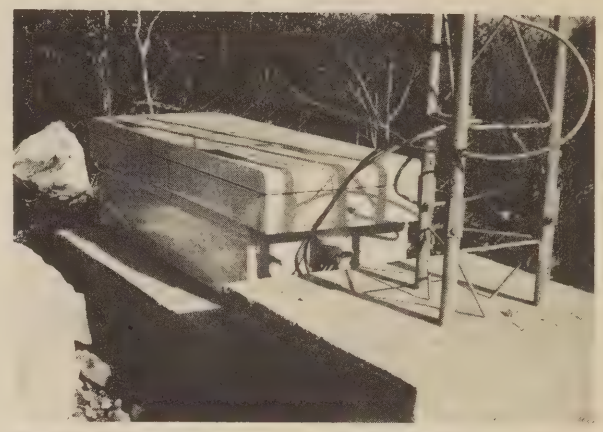
We feel the proper philosophy of the LPTV service falls someplace **between** local groups providing specialized services (Christian, ethnic) in metropolitan areas and individual entrepreneurs providing first time quality service in rural areas. We also feel that while UHF 100 watt and 1,000 watt stations are dandy, for a local group interested in serving a local area **VHF makes far more sense**. Personally, I would much rather have perhaps $10,000 invested and at risk in a rural area where there is no good quality local television than $50,000 invested and at risk in a metropolitan area where my LPTV system is going to have to compete with a dozen other off-air services and perhaps 30 channels of cable service.

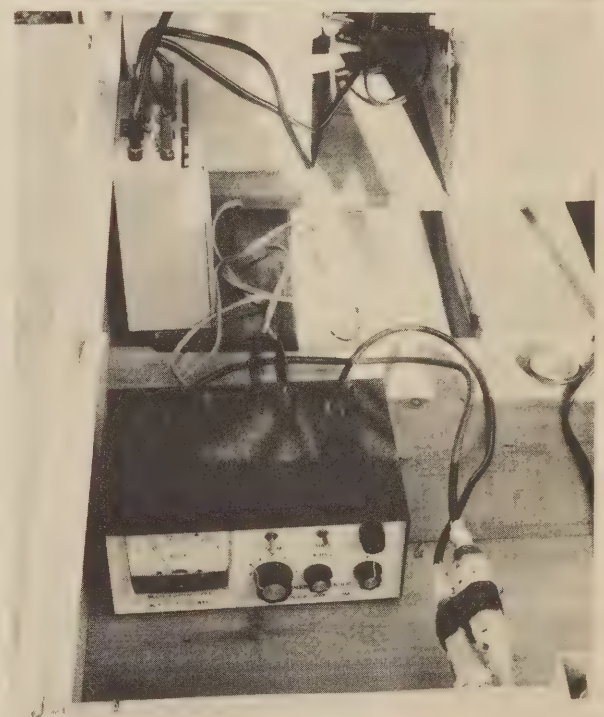
NOTES

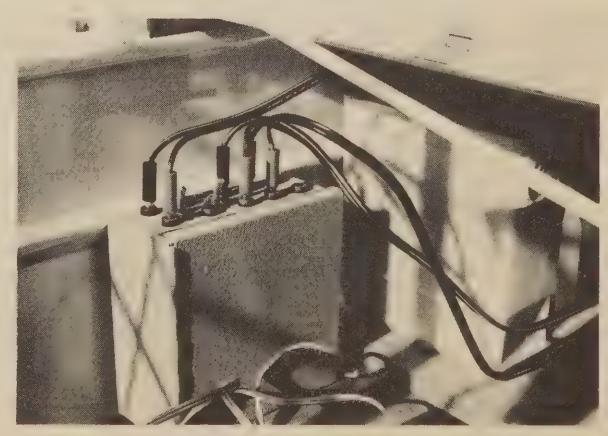
REFERENCE SECTION

Throughout the operational portion of this Handbook a number of products and firms are noted. Because this is a new industry with very few established suppliers who are designing and selling equipment **specifically for LPTV**, the system planner must also deal with suppliers in other fields who (perhaps by accident more often than not) have products in their lines which suit the economics and opertional requirements of LPTV. As the LPTV industry matures future editions of this Handbook will track the development of these firms and products and update the following listing. For now these represent the major sources for equipment in this area.

Acrodyne Industries / 21 Commerce Drive, Montgomerville, PA 18936. (Translators)
Anderson Scientific / Keith Anderson, Black Hawk, SD 57718 (Translators)
B&K Dynascan Corp. / 6460 W. Cortland St., Chicago, IL 60635 (model 1250 NTSC generator)
BEI (Beston Electronics, Inc.) / P. O. Box 106-A, Olathe, KN 66061 (CG-800 Marquee)
Blonder Tongue Labs, INc. / One Jake Brown Rd., Old Bridge, NJ 08857 (field strength meters, modulators, transmitting antennas, signal pre-amplifiers, BTVision scrambling equipment)
BOGNER Corp. / 401 Railroad Av., Westbury, NY 11590 (transmitting antennas / VHF & UHF)
CCA Electronics / Broadcast Plaza, Cherry Hill, NJ 08034 (Translators)
DAVCO Electronics / P. O. Box 861, Batesville, AR 72501 (transmitting - receiving antennas, feed/transmission lines, connectors)
EMCEE (Electronics, Missiles & Communications) / P. O. Box 116, White Haven, PA 18661 (Translators)
Gardiner Communications Corp. / 1980 S. Post Oak Rd., Suite 2040, Houston, TX 77056 (Channel Cue and TVRO receiving system equipment)
Jerrold Electronics / Hatboro, PA 19040 (transmitting and receiving antennas, modulators, signal pre-amplifiers)
M/A COM (Microwave Associates) / J. Duke Brown, 63 Third Avenue, Burlington, MA 01803 (microwave relay system packages, TVRO receiving systems)
UNR-Rohn / P. O. Box 2000, Peoria, IL 61656 (towers)
SCALA Radio Corp. / Box 4850, Medford, OR 97501 (transmitting and receiving antennas)
SHINTRON / 144 Rogers St., Cambridge, MA 02116 (model 505 downstream titler)
SITCO / 10330 NE Marx, Portland, OR 97220 (transmitting and receiving antennas)
TACO / One Taco St., Sherburne, NY 13460 (transmitting and receiving antennas)
Television Technology Corp. / 5970 W. 60th Av., Arvada, CO 80003 (Translators)
3M Video Ssytems / 3M Center, St. Paul, MN 55101 (Model 80-9700-0077-6 video switcher with video)
SPACE / Society of Private And Commercial Earth terminals, 1521 O Street NW, Washington, D.C. 20005







NOTES

NOTES